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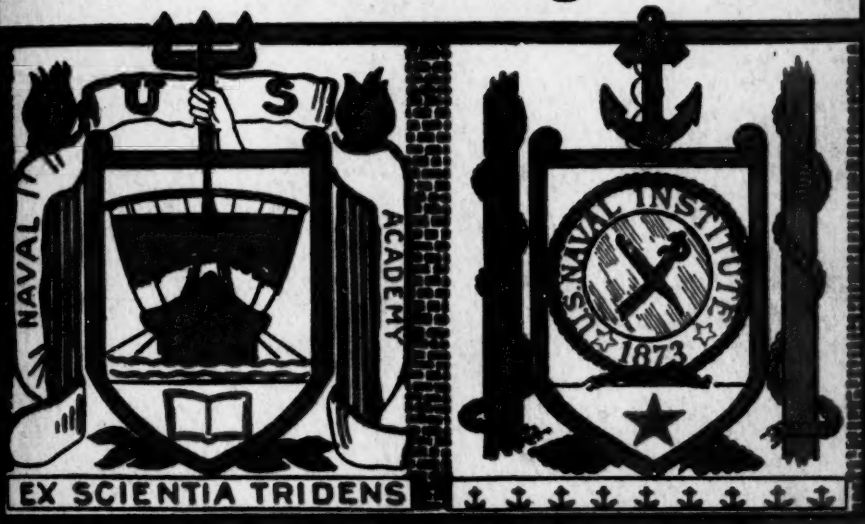

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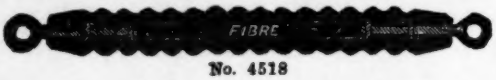

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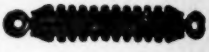
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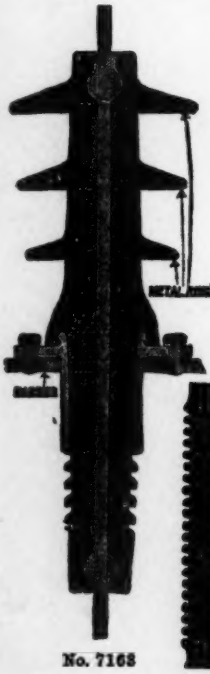

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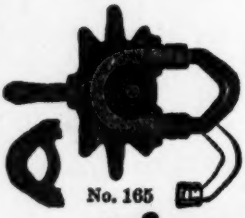
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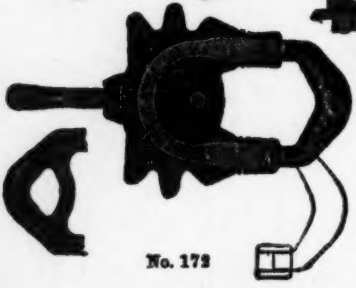
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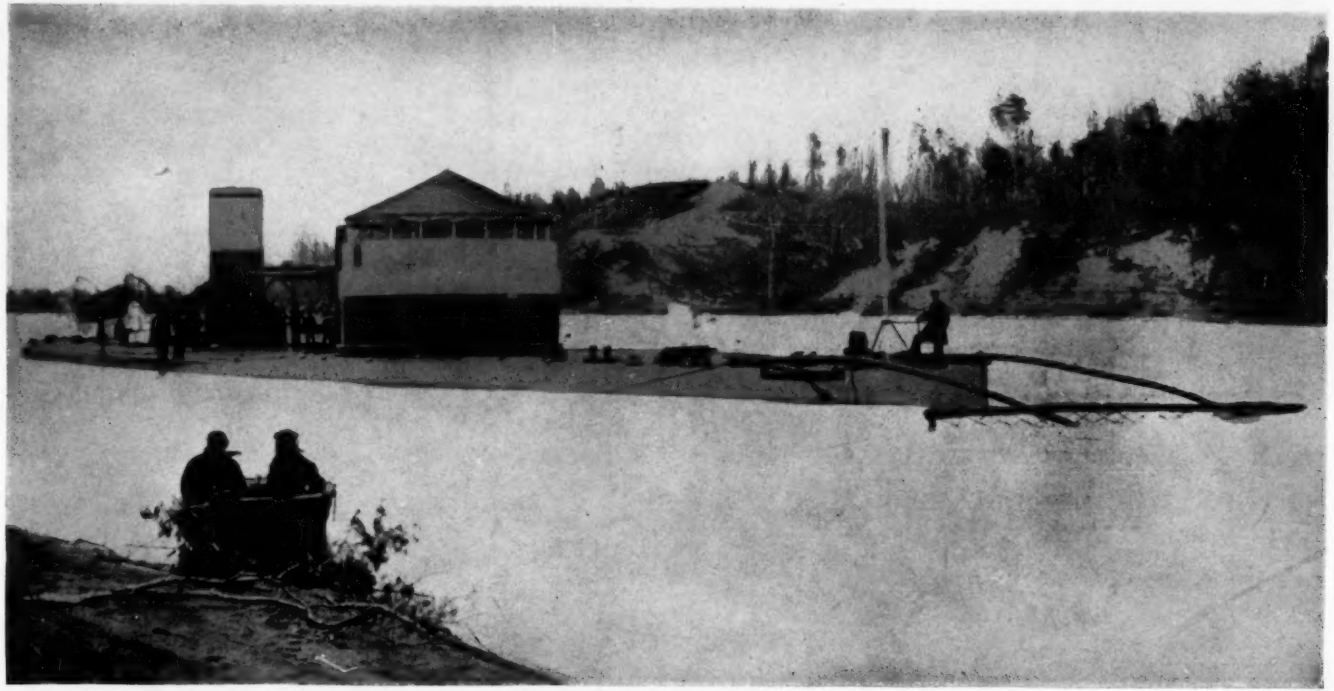

ONE OF THE "FIGHTING RAFTS", 1864.

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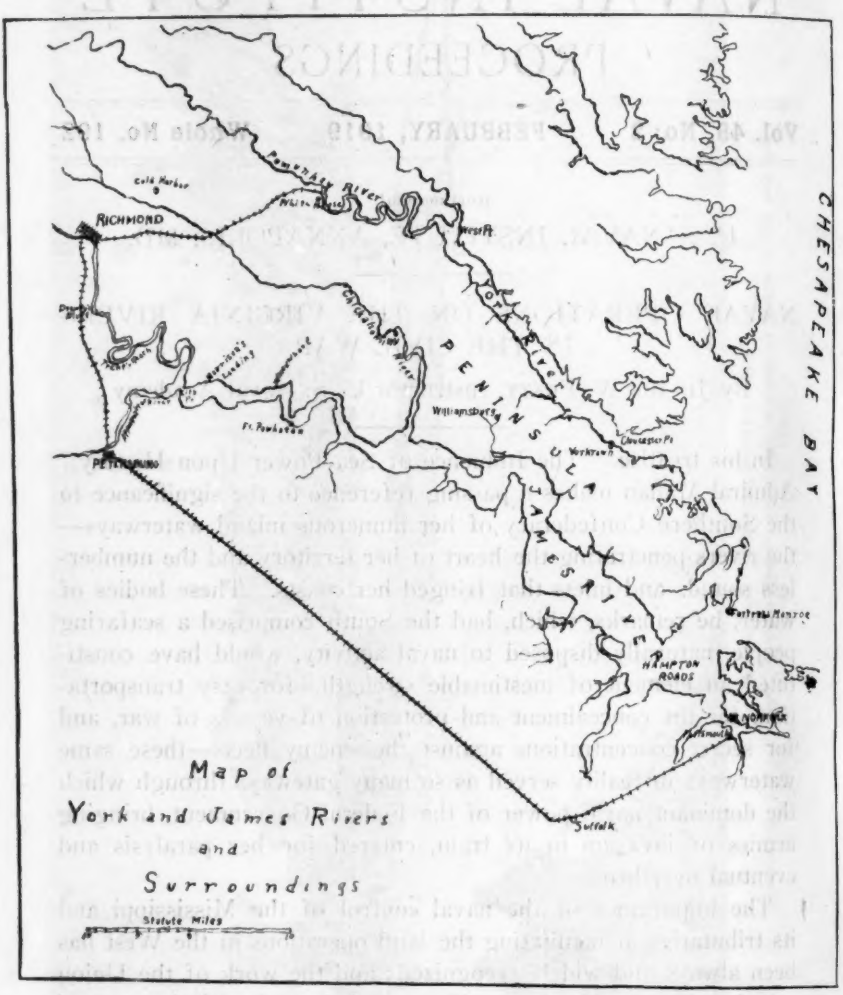
NAVAL OPERATIONS ON THE VIRGINIA RIVERS IN THE CIVIL WAR

By JULIUS W. PRATT, Instructor U. S. Naval Academy

In his treatise, "The Influence of Sea Power Upon History," Admiral Mahan makes a passing reference to the significance to the Southern Confederacy of her numerous inland waterways—the rivers penetrating the heart of her territory and the numberless sounds and inlets that fringed her coasts. These bodies of water, he remarks, which, had the South comprised a seafaring people, naturally disposed to naval activity, would have constituted an element of inestimable strength—for easy transportation, for the concealment and protection of vessels of war, and for secret concentrations against the enemy fleets—these same waterways in reality served as so many gateways through which the dominant naval power of the Federal Government, bringing armies of invasion in its train, entered for her paralysis and eventual overthrow.

The importance of the naval control of the Mississippi and its tributaries in facilitating the land operations in the West has been always and widely recognized; and the work of the Union squadrons in the North Carolina sounds has—largely because of Cushing's sensational feat in torpedoing the ironclad ram *Albemarle*—received considerable notoriety in the histories of the war. But there is one little-noted group of naval operations, performed quietly and for the most part without incidents of a striking

character, which nevertheless had a most important, not to say determining, effect upon two of the major and one of the decisive campaigns in the eastern Confederacy. Without the



steady support of the navy in the Virginia rivers, McClellan's peninsula campaign, if begun at all, would have ended in disaster instead of mere frustration, and Grant's final campaign against Richmond would not only have been beset with enormous diffi-

culties, but must have been fought out on entirely different lines. It would be hard to exaggerate the importance to the safety of the Northern armies of the naval control of these waters; and that control, while never broken, was at times seriously threatened, and maintained only by vigilant and vigorous action on the part of the Northern fleet.

To compare Chesapeake Bay and the James River with the broad waters between our coast and France, or to mention the dozen or so improvised war vessels of the James River Flotilla in a breath with the Allied navies of the present day, may have a touch of the ludicrous. Yet the pygmy flotilla in those narrow waters did for the Union forces in '62 and '64 precisely what the great navies have been doing of late: it made possible the safe movement of troops across waters impassable without its aid, and it kept open the essential lines of communication between those troops and their ultimate base of supplies. If sea power is to be measured not in absolute ship tonnage and weight of guns, but in ability to control essential waterways and thus determine the outcome of wars, then the operations on the James River deserve a place in the history of sea power—a place never hitherto accorded them by even the naval historians.

The most serious danger to federal naval supremacy in these waters came early in the war and at a time most critical for the military plans of the government. It was in March, 1862, that the ironclad *Merrimac* made her sensational appearance in Hampton Roads, where in one afternoon she destroyed two vessels of the blockading squadron and left the others intact only because of darkness and the ebbing tide. The *Merrimac's* sortie was not only a threat at the entire blockade program of the North; it seemed for the moment to have frustrated in a few hours' time the elaborate plans already perfected for the movement of McClellan's army, by water, to Fortress Monroe and the blow at Richmond from that quarter, where the army must be dependent upon a long line of water communications. And it was not until the engagement with the *Monitor* had materially reduced this source of danger that the great convoy carrying McClellan's army moved from the vicinity of Washington to Fortress Monroe.

From the *Monitor-Merrimac* engagement to the end of the Peninsula campaign the Union vessels on the York and James

had no further encounters with Confederate ships, but their dominant presence was none the less important. They not only exercised the same sort of silent yet all-important safeguarding of communications which has in recent times been the chief work of the Allied navies; in addition, their guns time after time rendered the most signal assistance to the troops on shore.

As McClellan, early in May, moved up the narrow peninsula between the York and James, naval vessels kept progress with his march. On the York and its tributary, the Pamunkey, they cooperated with the troops in skirmish after skirmish, cleared the rivers to White House, McClellan's new base, and opened and held his line of communications between that point and Fortress Monroe and Washington. On the James, they advanced to within seven miles of Richmond, where they were at length held by the strong batteries at Drewry's Bluff. They were in position to cooperate more actively with the army had McClellan's advance continued; as it was, a less glorious but no less important rôle was reserved for them—the salvation of McClellan's army after its unfortunate experiences in the Seven Days' fighting.

After a week of indecisive engagements across the head of the peninsula, McClellan, as always seeing his foe double their real strength, decided upon retreat—not upon his old base at White House on the Pamunkey, but upon the James. His first contact with that river was at Malvern Hill, where in the battle of July 1 the naval vessels materially aided him by shelling the reserve positions of the Confederates. On the day of this engagement he wrote to Flag-Officer Goldsborough of the North Atlantic Squadron: "I would most earnestly request that every gunboat or other armed vessel suitable for action in the James River be sent at once to this vicinity." On the same date, Commander John Rodgers, in immediate command on the James, reported to Goldsborough: "The army is in a bad way; the gunboats may save them, but the points to be guarded are too many for the force at my disposal. . . . To save the army, as far as we can, demands immediately all our disposable force. . . . Now, if ever, is a chance for the navy to render most signal service, but it must not delay."

The navy did not neglect its opportunity. No sooner had the army arrived at Harrison's Landing, its destination on the James, than Rodgers placed his gunboats and ironclads upon its

two flanks, where they gave the direct protection of their guns as well as the assurance that communications should be maintained. The importance of this work is evidenced by a department order of July 6 designating the James River Flotilla an independent division of the North Atlantic Squadron, a position which it held until the last of August, when the army had been withdrawn from the peninsula and the necessity of controlling the James had ended. Admiral D. D. Porter thus summarizes the navy's work in this campaign: "Without it, the Grand Army of the Potomac could not have been moved so successfully to the Peninsula; and it is scarcely yet forgotten how, in the most trying times, when that army seemed to be in danger of annihilation, the navy was at hand to give shelter under its guns to our retiring and weary troops, and drive back the excited and victorious foe, who would have driven our soldiers into the river, or made them lay down their arms."

For almost two years after the above events the James River saw little of naval activity. While the North maintained a nominal control of the river, little use was made of it other than for an occasional expedition for the destruction of military stores or other contraband. In the meanwhile the Confederates at Richmond were busy mining the river with electric torpedoes and building a fleet of river vessels which it was hoped might meet successfully the next attempt to approach Richmond by water. The *Merrimac*, or *Virginia* as she had been rechristened, had proved of too deep draft to be taken up the river and had been destroyed at Norfolk, but her two wooden consorts, the *Patrick Henry* and *Jamestown*, had steamed to Richmond, there to form a nucleus for the new flotilla. Three new ironclads, of the same general character as the *Merrimac* but in every way lighter, were constructed, and to these—the *Virginia II*, *Richmond*, and *Fredericksburg*—were added the wooden gunboats *Nansemond*, *Hampton*, *Beaufort*, *Raleigh*, *Drewry*, and a vessel referred to as "Davidson's torpedo boat." The difficulties encountered by the Confederates in building men-of-war are indicated by the following bit of description of the *Nansemond* and *Hampton*: "These vessels," wrote a Confederate officer, "had saw-mill engines, and when they got under way there was such a wheezing and blowing that one would suppose all hands had been attacked with asthma or heaves."

But, primitive and inefficient as it was, this "fleet in being," as we shall see, caused great anxiety in the minds of the opposing naval and military commanders in the most important campaign of the war, and detained for service in the James several powerful ironclads which might have been used to advantage at Mobile Bay, Charleston, or Fort Fisher.

In March, 1864, Ulysses S. Grant, now with the rank of Lieutenant General, revived especially for him, was placed in supreme command of the armies of the United States. On the fourth of May he crossed the Rapidan and moved against Richmond. In several weeks of fighting in which he tried repeatedly to encircle Lee's right flank, he met with a series of bloody reverses, culminating June 3 at Cold Harbor. He was on McClellan's old battle ground, scarcely nearer Richmond than when he had begun. But Grant, the very antithesis of McClellan, never recognized defeat. Blocked by an impenetrable wall this side of Richmond, he turned his eye in another direction—Petersburg, south of the James on the southern approaches to the Confederate capital.

Already a minor campaign against Petersburg had been opened by the Army of the James under General Butler, supported by the Union fleet. As far back as April 8 Grant had telegraphed to General Halleck in Washington: "It is the intention to operate up the James river as far as City Point, and all the cooperation the navy can give us we want. Two of the ironclads are wanted as soon as they can be got. You will know how to communicate our wants to the Secretary of the Navy."

In pursuance of this request, Acting Rear Admiral S. P. Lee had on May 5 successfully convoyed Butler's transports from Hampton Roads and landed them without opposition at City Point on the upper James. Seven wooden vessels had been detailed to precede, dragging the river for torpedoes. Closely following came the main column—four monitors and the captured ironclad *Atlanta*, each towed by two gunboats or tugs. Advancing westward from City Point toward Petersburg, Butler occupied a line stretching from Trent's Reach on the James to the Appomattox River, while, at his request of May 13, Admiral Lee's squadron moved up through the curves and shallows of the upper James and took up its position on Trent's Reach, covering the right flank of the army. The movement was attended with

considerable danger. Already two vessels had been destroyed, one caught beneath an overwhelming fire from a masked battery on shore, the other blown up by one of the torpedoes with which the river was veritably studded. "Torpedoes, commanded by rebels on the left bank, which commands our decks," Lee wrote to Secretary Welles, "and shoal water, by chart, by several feet less than the monitors draw, make difficult the advance." Nevertheless, Lee was able to report on the seventeenth that the advance had been successfully accomplished and that the monitors in Trent's Reach protected Butler's flank.

When, therefore, General Grant determined to throw the Army of the Potomac across the James, the southern bank of that river at the proposed point of crossing was already in Union control and the navy was in position to guard the crossings at Willcox's Wharf and Fort Powhatan. Even before the battle of Cold Harbor it is evident from the correspondence of Generals Grant and Butler, Rear Admiral Lee, and the Secretary of the Navy, that the move across the James was contemplated and that the necessity of controlling the river was thereby rendered imperative. On June 1 Rear Admiral Lee had requested that the monitor *Tecumseh,* ordered to sea May 28, be left under his command, and that further reinforcements be sent, because of "the importance of this river to the armies of Generals Grant and Butler." Again on June 3 the same officer mentioned in his correspondence with General Butler the "necessity . . . . . of holding this river beyond a peradventure for the great military purposes of General Grant and yourself." And Butler a few days later wrote to Lee: "The necessity of holding our positions here is an 'overwhelming' military one." The absolute necessity of holding the river safe against attack from above is further emphasized by the following passage from Grant's "Memoirs": "It was known," he writes, "that the enemy had some gunboats at Richmond. These might run down at night and inflict great damage upon us before they could be sunk or captured by our navy."

In order to secure control of the river "beyond a peradventure" the military authorities determined upon a course exceedingly distasteful to Rear Admiral Lee. In the last days of May General Butler had suggested that the channel at Trent's Reach be obstructed by the sinking of a half-dozen stone-laden

schooners in the river at that point—a suggestion to which Lee had given qualified assent. He did not, however, relish the idea of barricading his fleet against attack from a presumably inferior force, and on June 2 Butler, in a letter that contains some striking passages, undertook to assuage the admiral's delicacy. "I am aware," he wrote, "of the delicacy naval gentlemen feel in depending upon anything but their ships in a contest with the enemy, and if it was a contest with the enemy's ships alone, I certainly would not advise the obstructions, even at the great risk of losing the river; but in a contest against such unchristian modes of warfare as fire-rafts and torpedo-boats, I think all questions of delicacy should be waived by the paramount consideration of protection for the lives of the men and the safety of the very valuable vessels of the squadron." Lee was not altogether convinced by Butler's argument. He replied noncommittally, and on June 7 he asked instructions from Secretary Welles, transmitting his correspondence with Butler, pointing out that his ironclad force was stronger than Grant had asked for, and adding: "The navy is not accustomed to putting down obstructions before it, and the act might be construed as implying an admission of superiority of resources on the part of the enemy." But Secretary Welles declined to relieve the perplexed admiral of the responsibility of the decision, replying on June 11, "Action in this matter is left to the discretion of the admiral of the squadron, in whom the department has confidence." Between the indecision of Lee and that of Butler, the question dragged along without action, and it was not until the fifteenth, when half the Army of the Potomac had crossed the James, that a peremptory order from Grant led to the sinking of the schooners. In the meantime the safety of two Union armies depended entirely upon Admiral Lee's force of monitors and gunboats.

Why was the Confederate flotilla all this time inactive? Admiral Lee and his officers were in constant expectation of an attack. Confederate deserters again and again reported an attack as imminent. Not only was there hope of cutting Butler's communications and damaging his base, but from June 7 on, Grant's intention of crossing the James was an open secret in Richmond. Why, then, was no effort made to interfere with these vitally important operations? The answer—aside, of course, from the risk entailed by the inferior strength of the Confederate flotilla—

appears to lie in incompetence, in the absence of any resolute, determining will, in the reference of vital decisions to councils-of-war, which notoriously "do not fight."

As early as May 7 Secretary of the Navy Mallory was urging upon the Confederate War Department the need of haste in opening a passage through the old Confederate obstructions at Drewry's Bluff. It was hoped that an advance of the three ironclads down the river would put an end to the mine-sweeping operations of the wooden gunboats and compel the monitors to come forward, where, with good fortune, they might be torpedoed. But the removal of the obstructions was attended with great delay. It was not until May 24 that the *Richmond* and *Virginia* were able to pass the opening, and before that time, as we have seen, the Union flotilla had completed its advance and covered Butler's flank on Trent's Reach.

Flag-Officer John K. Mitchell, commanding the Confederate flotilla, now proposed an immediate attack upon the Union forces below. Fire rafts were to be sent ahead to throw the enemy into confusion; then the ironclads and gunboats, all equipped with torpedoes, were to make their attack in the darkness or semi-darkness of early dawn. Secretary Mallory approved the plan; there seemed some chance of success. But the attack was postponed from day to day. At one time the *Fredericksburg* had engine trouble. At another the shore batteries were unable to co-operate, General Beauregard showing a disinclination to work harmoniously with the naval forces. Lack of torpedoes occasioned further delay. The date of attack was postponed until the thirtieth. On that date Mitchell submitted his plan of attack to his officers, who disapproved it. Finally, on June 8, he submitted the entire question of offensive action to a council-of-war. The council held an attack to be inadvisable because of the strength and disposition of the opposing force, low water, and narrow channels. This report Mitchell submitted to the Secretary on June 13. Two days later the sinking of the obstructions in Trent's Reach rendered all offensive plans for the time being futile. The Confederate navy had lost whatever chance it may have possessed of blocking or hampering Grant's southward movement.

This movement, "the greatest feat of his military career," Grant accomplished with incredible rapidity and secrecy. On

June 14 the advance of his army reached the James. On the seventeenth he was able to report to General Halleck: "Our forces drew out from within fifty yards of the enemy's intrenchments at Cold Harbor, made a flank movement of an average of about fifty miles march, crossing the Chickahominy and James rivers, the latter 2000 feet wide and 84 feet deep at point of crossing, and surprised the enemy's rear at Petersburg. This was done without the loss of a wagon or piece of artillery and with the loss of only about 150 stragglers, picked up by the enemy."

The passage of the James opened the Petersburg campaign, which was to result in the fall of Richmond and the end of the war. The part played by the navy was neither brilliant nor spectacular, but upon it depended absolutely the success of the campaign. Without the naval control of the river, Grant's army could never have crossed in the first place; nor, without that control, could a mile of the long line of water communications between City Point and Hampton Roads have been kept open. The army before Petersburg would have been in an impossible position. Its safety and its hope of success rested with the river squadron, whose quiet work guarded bases and transport lines from the formidable ironclads up the river. That the danger from these ships was no chimera of the imagination was shown when, in January, 1865, they made their last attempt to attack the Union forces. On this occasion they succeeded in breaking through Butler's obstructions at Trent's Reach, and only the presence of the powerful monitor *Onondaga* prevented the inflicting of great damage upon the Union forces.

To the importance of this naval activity on the James we have the testimony of no less an authority than General Grant himself. In answer to an inquiry whether a part of the ironclad force on the James might safely be withdrawn, Grant wrote, in July, 1864: "Whilst I believe we will never require the armored vessels to meet those of the enemy, I think it would be imprudent to withdraw them. . . . . There is no disguising the fact, that if the enemy should take the offensive on the water—although we probably would destroy his whole James river navy—such damage would be done our shipping and stores, all accumulated on the water near where the conflict would begin, that our victory would be dearly bought."

But even such testimony is very far from an adequate statement of the navy's case. The strength of that case is apparent at once if we but ask the question: What if the South instead of the North had possessed the preponderant strength on these inland waters? The answer, of course, is this: Not only would such campaigns as McClellan's and Grant's have been altogether impossible with respect to both the movements of the armies and the maintenance of their communications, but the whole character of the war would have been altered—the South would have possessed the offensive, and Washington instead of Richmond would have sought protection behind obstructions and inferior fleets. It is, of course, a truism that without its fleets the North could never have won the war; but it is high time that the control of the Virginia rivers was recognized as one of the great phases of the navy's work, worthy a place scarcely below the Mississippi operations and the blockade.

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By REAR ADMIRAL BRADLEY A. FISKE, U. S. Navy (Retired)

It is an old story of the navy that a captain of the forecastle once brought a captain of the head to the mast to make a report against him; and that when the officer of the deck inquired what was the nature of the offence, the captain of the forecastle answered, "Why, sir, he don't take no pleasure in his work."

The story is supposed to be amusing, from the fact that the duties of the delinquent were not such as would be expected to give a man much pleasure; but it is instructive, because it shows that the experience of the captain of the forecastle had taught him that men do not usually do their work well, unless they take pleasure in it.

There are, of course, many kinds of pleasure; but it is the experience of most men past middle life that there is no pleasure more lasting, or more certain to be realized, than the pleasure of doing work, if one does it well. Other pleasures may be keener; but, on the general principle that one always has to pay for what he gets, pleasures that are pleasures merely, especially pleasures that are keen, are usually expensive in some way; whereas, the pleasure of doing work well is automatically paid for by the doing of the work.

Now, one of the functions of the Naval Institute is to present the problems of the navy in such a way as to make officers see how much variety and interest they possess, and how much pleasure can be secured by working on them. Without some such stimulus as the Institute, the navy would be less like a profession and more like a trade; we would be less like artists, and more like artisans; we would become too practical and narrow; we would have no broad vision of the navy as a whole, each one

of us would regard his own special task as the only thing that concerned him, and would lose that sympathetic touch with his brother officers which all of us now enjoy.

The Naval Institute is a club at once social and professional, which is not restricted to any club-house on any avenue in any city, but which spreads over all the oceans to all of our ships and stations, down even into the depths of the sea where our submarines lie, and ten thousand feet into the air where our aeroplanes fly. It is the embodiment of the thought of the navy. It is the unofficial custodian of the navy's professional hopes and fears. It looks ahead into the future, and back into the past, and keeps track of the happenings of the present.

During the forty-five years that have elapsed since Admiral Luce wrote the first article in the first number of the Naval Institute, the Naval Institute has been the most stimulating single agency that has existed for the development of an American navy; for, while the official publications of governments, and the official reports concerning their activities, are our surest sources of information as to what other navies are doing, yet their only usefulness to us, is in showing us what foreign ideas we should adopt; whereas the Naval Institute enables officers to look into the great beyond, and discuss and perhaps develop ideas of their own on original American lines. Officers are officially responsible for the discharge of their official tasks, and are of necessity compelled to strict reticence concerning them; but the Naval Institute, by reason of its unofficial character, enables them to get out of the rut of the actual sometimes, and soar among the glories of the possible.

In the early days of the Naval Institute, it was ridiculed by a large class of naval officers, who called themselves "practical." They were practical, but that was all. To them, the whole of the naval profession was comprehended in the practice of the various drills and exercises in gunnery, seamanship, navigation, etc., which they saw in any ship. Their highest ideal of an officer was a man who performed those duties well.

All honor to those sterling men, but how limited was their vision! Not only did they fail to foresee the great advances about to be made in their profession by the "theorists" whom they contemned, but they also failed to see that the very arts which they then practiced owed their actual existence to the class

of men they stigmatized. They failed to see that the very ships which they sailed so boldly, could not have carried them over the seas if "theorists" had not theoretically ascertained the laws of buoyancy and propulsion, and applied those laws to the making of engines, sails and ships. If the naval profession were like that of breaking stones along the road, those officers would have been right; because each officer after "learning his job" would have been able to practice it thereafter in a thoroughly practical and efficient way; just as a man can break stones on the road day after day, in a thoroughly practical and efficient way. What those brave and forceful, but partially blind, men failed to see, was the intellectual future of all navies, and the consequent necessity of enlisting in the service of our navy the various intellectual faculties of men; and of assisting those faculties with whatever aid the literary art might give; in order that our officers might have placed before them in the most inspiring form as many and as good problems, suggestions, and ideas as possible.

For many years, the Naval Institute maintained a precarious existence; and it was not until within the last, say fifteen years, that it became thoroughly established in good favor. Doubtless, one element in assisting it has been a realization of the fact that, in the competitive race for excellence which navies have been holding, the use of scientific instruments and methods might have a determining effect. This competition still exists, with abundant indication that it is going to continue to exist.

One of the factors which has handicapped the Naval Institute has been a curious shyness about writing articles for it. This shyness existed much more in the past than it does now; but it still exists to a degree that is really lamentable. Scores of times I have said to some officer who had made some suggestion, or described some instructive experience, "You ought to send that to the Institute," and he has answered, "But I can't write." Now, *any man who can think can write*. Writing is merely recording. If a man has anything to record, writing can record it.

The so-called faculty of writing is not so much a faculty of writing as it is a faculty of thinking. When a man says, "I have an idea but I can't express it"; that man hasn't an idea but merely a vague feeling. If a man has a feeling of that kind, and will sit down for a half an hour and persistently try to put into writing what he feels, the probabilities are at least 90 per

cent that he will either be able to record it, or else realize that he has no idea at all. In either case, he will do himself a benefit.

So far, in this article, it has been assumed that the articles of the Naval Institute are, or ought to be, extremely serious. Possibly, most of them should be; life itself is mostly serious, and so is naval life, and so should be the Naval Institute. But life is not wholly serious; and the most useful lives have usually been lives in which the strain of serious work was relaxed by frequent recreation, and brightened with wit and humor. Possibly, the Naval Institute has too large a proportion of seriousness in its pages, and this is my individual opinion. But this is not the fault of the Institute; because the Institute has made persistent efforts to induce officers to write of any exciting or amusing experiences they might encounter. The lack of success which the Institute has met in getting due response has not been only amazing but deplorable. Why should officers hesitate to write in the NAVAL INSTITUTE PROCEEDINGS of those exciting and funny experiences which naval officers have in a greater degree than do any other men in the world?

The Naval Institute has been of inestimable value to the navy in the past, and it can be made to be of inestimable value to the navy in the future. Whether it shall be so or not will depend on United States Navy officers. The degree of support which they give to the Institute by contributing to its maintenance, by reading the articles it prints, and by writing articles themselves, will determine the amount of good which the Institute can do to the navy. It is the duty of every officer, therefore, to do his utmost to support it.

The Navy of the United States is now embarking on a career of greater importance and splendor than it even imagined a few years ago. No one thing can guide and brighten its path more wisely and more happily than a properly supported and encouraged Naval Institute. "Cast thy bread upon the waters, and it will return to thee after many days."

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

OUR NEWEST NAVY

HOW ITS COST IS BEING DETERMINED

By CAPTAIN DAVID POTTER, Pay Corps, U. S. Navy

I

Several hundred vessels of our newest navy—vessels of types from battle-cruiser to mine-sweeper and to torpedo-testing barge—are being constructed at more than a score of civilian shipyards. These vessels are being built, so far as concerns matters of cost, upon a basis of their actual cost plus a profit on such actual cost.

The administration of the matters of cost under these cost-plus-profit contracts has been entrusted by the Secretary of the Navy to a group of officers called the Compensation Board. In accordance with a nomenclature first used by the Bureau of Supplies and Accounts, the name "Cost Inspection" has been given to the work performed under the cognizance of the Compensation Board. This cost inspection has already attracted the earnest attention of shipbuilders, of producers of raw materials, of economists, of financiers, of fiscal officials, and of accountants.

Some reasons for this wide interest will be found in a brief account of cost inspection set forth in this article. The cost inspection herein referred to has no connection with any determination of costs arrived at by the United States Shipping Board, Emergency Fleet Corporation, for vessels being built by and for that corporation—the navy is not charged with supervision over the construction or the costs of construction of the vessels of the Emergency Fleet Corporation.

Let him who ventures to read further take heart of grace! Here he shall find no cryptic "graphs" or diagrams, no co-ordinates or abscissæ marking cost-curves better left unplotted. He shall find few arrays of figures, and none of them appalling. Those phrases, melodious to certain ears—interest on investment,

deferred charges, shop cost, day rate, piecework, machine rate, non-productive labor—shall ring not at all in these pages. There will here be found almost none of the jargon of the schools of accountancy.

II

I fancy that every explorer in a new land has a peculiar pride in his discoveries in that land, quite aside from the charm he finds in the contour of its landscape or in the sweep of its rivers. The sense of something achieved that filled the soul of Columbus in his discovery of America, of Cortez in his conquest of Mexico, of da Gama in his rounding of the Cape of Good Hope, must have been well-nigh divine. So, too, Newton's understanding of the significance of gravity, Watt's realization of the potentialities of steam, or Whitney's invention of the cotton gin, was, in its way, almost as soul satisfying. Hardly less so, to the persons concerned, were the conclusions of Taylor and Gantt in regard to scientific management, and the exposition by Hamilton Church of the advantages of the use of the capacity-factor in the prorating of indirect expense.

Boldly to compare, therefore, the explorations of the members of the Compensation Board and of the officers of the bureaus with the explorations of other men, perhaps there may be conceded to the officers concerned the right to feel that something has been achieved by their initiation of cost inspection in this country.

The Secretary of the Navy, by his order of March 22, 1917, and supplementary orders issued from time to time, organized the Compensation Board—made up of representatives of the Line, the Construction Corps, the Civil Engineer Corps, and the Pay Corps. The department directed the board, first, to ascertain, estimate, and determine, in accordance with the terms of contracts, the actual costs of vessels building or about to be built under contract with the Navy Department, on a "cost-plus-profit" basis; second, to decide upon, control, and supervise the execution of all methods necessary to be established to carry out its duties, especially those defined in the contracts for vessels building or to be built upon the "cost-plus-profit" basis.

The Compensation Board at once requested the Bureau of Supplies and Accounts to call upon officers of the Pay Corps ex-

perienced in accounting to make recommendations as to methods of cost inspection. These recommendations were promptly submitted. After consideration of the various plans proposed, the Compensation Board formulated general instructions under which cost inspection has since proceeded.

In addition to the indispensable aid of the officers of the regular Pay Corps, the Compensation Board has received the self-sacrificing assistance of a group of professional accountants and financiers—able and accomplished officers commissioned in the Pay Corps Naval Reserve Force and assigned to duty with the Compensation Board. Officers of the Bureaus of Steam Engineering, Construction and Repair, Yards and Docks, and Supplies and Accounts, as well as the jurists of the office of the solicitor for the Navy Department, have also furnished invaluable help.

III

Prior to March 22, 1917, vessels built for the navy at civilian shipyards were built on a fixed-price basis. A torpedo-boat destroyer, exclusive of armor and armament, used to cost the navy from $550,000 to $900,000. A battleship of the first class cost the navy from $4,400,000 to $7,500,000. These prices, of course, represented expenditures made by the shipbuilder for direct labor and for direct material, plus indirect expense, plus his profit. What amount of a shipbuilder's fixed-price to the navy was profit was not known to the navy, although close estimates were made by the navy's representatives. It is not unreasonable to say that even if the shipbuilder knew pretty closely what expenditures he had made for direct labor and for direct material, he did not know how much of his selling price was overhead and how much was profit. The price the shipbuilder fixed to the navy was, at best, only an estimate, the estimate based on "experience" or "judgment," which, being interpreted, too often signified only a guess.

The increasing cost of raw materials and the increasing cost due to high wages paid to employees resulted in the prices named by the shipbuilders to the navy reaching a very high figure. Indications of the inevitable result of these increased prices asked by the shipbuilders from the navy were given again and again by the Navy Department. These indications were given not only in the form of tenders renewed and rejected, but, specifically, in

the form of requests from the Navy Department to shipbuilders that lower prices should be offered, if possible.

But induced by what they believed to be economic necessity, and inspired by motives of self-protection, the shipbuilders who were accustomed to construct naval vessels continued to make tenders only of prices unacceptable to the Navy Department. The Navy Department became convinced that the prices demanded by the shipbuilders were unnecessarily high—that the percentages to cover contingencies were greater than the contingencies would actually require.

It is certain that it was the duty of the Navy Department, while affording shipbuilders opportunity to earn a reasonable profit, at the same time to protect the interests of the government to the fullest extent of its powers. This duty it has performed to the utmost.

By the act of August 29, 1917, under the heading "Increase of the Navy," it was provided,

> That if, in the judgment of the Secretary of the Navy, the most rapid and economical construction of the battle cruisers authorized herein can be obtained thereby, he may contract for the construction of any or all of them upon the *basis of actual cost, plus a reasonable profit to be determined by him.*

As brief as the above quoted lines are, they mark the granting of a power to the government which was to result in revolutionizing the financial and accounting features of the construction of naval vessels at civilian shipyards. It is possible, even, that a revolution was begun in the whole economic situation of the shipbuilding industry. The above-quoted provisions of law were supplemented by certain vital provisions in the act of March 4, 1917, the act of October 6, 1917, and the act of July 1, 1918. It is the appropriate provisions of the respective naval appropriations bills which made possible the construction of naval vessels at private shipyards on the basis of actual cost plus an agreed-upon amount of profit.

IV

During the autumn and winter of 1916 and the winter and spring of 1917, the Navy Department, and its duly authorized representatives, were engaged in endeavoring to persuade what may be called the "old-line" shipbuilders to agree to construct

naval vessels at an acceptable fixed-price. Failing this, the Navy Department endeavored to agree with the shipbuilders upon a proper cost-plus-profit basis upon which to proceed with the work of construction.

For several years, a considerable amount of ordinary building-erection has been done in America on a cost-plus-profit basis. It is evident, however, to anyone who has knowledge of shipyard work that ordinary building-erection on a cost-plus-profit basis is a very different thing from the construction of vessels on the same basis. Without entering into details, it is believed that this will be conceded.

Since the beginning of the European war, in 1914, and in a few sporadic instances before that time, certain civilian steamship companies had had vessels constructed at civilian shipyards on a so-called cost-plus-profit basis. The word "so-called" is used advisedly, since checking of such costs, either by the shipbuilder or the steamship company, was little more than nominal. The steamship companies had no, or at least very inadequate, machinery for verifying the records of cost presented by the shipbuilders. Further, except for approximately correct records of direct labor and direct material charges, the records of cost of the shipbuilder, as presented to the steamship company for payment, were little better than estimates. In fact, such records had all the joyous freedom from restraint of an ordinary fixed-price contract.

In a word, almost no precedent existed in America for the determination of costs of vessels being constructed on a cost-plus-profit basis.

It may be noted, in passing, that since the beginning of the European war, a vast amount of naval construction has been done in Great Britain on a cost-plus-profit basis. It is interesting to note, further, that such method of construction in Great Britain, on the whole, is not regarded by the British authorities as a success, so far as keeping down costs is concerned. Examination of British records in the case indicates, however, that this feeling of failure is not so much due to the fact that costs have been excessive—if, indeed, they have been—but is due to the difficulties encountered by the British authorities in satisfactorily checking the records of costs. Upon perusal of the British hearings, it is not certain, as a matter of fact, that costs have not

been satisfactorily checked; but the feeling of dissatisfaction seems rather to have arisen from the difficulty found by government representatives in making clear to the committees of parliament that costs have been adequately checked.

V

For the purposes of the present consideration, there are four practicable divisions of contracts. The differences between the four kinds are sufficiently well defined in the report of a sub-committee of the Inter-Departmental Cost Conference. This conference was composed of representatives of the Department of Commerce, of War, of Navy, of the Federal Trade Commission, the Council of National Defense, and the War Industries Board. A sub-committee of the Inter-Departmental Cost Conference drew up a report known as "Remarks on Contracts" (July 31, 1917). As this is a clear exposition of the advantages and disadvantages of the four different kinds of contracts, some part of the remarks is quoted.

A. THE FIXED SUM CONTRACT

By this is meant the form of contract in which the contractor, generally in competition with other contractors, bids a fixed lump sum for the furnishing of supplies or the performance of services (other than personal) under conditions laid down by the government. .

* * * * * * * *

To summarize then—this form of contract has the advantage of simplicity but has the disadvantages of establishing a diversity instead of a community of interest between the government and the contractor, of demoralizing the supply and prices of raw materials, and of requiring increased time to secure competition.

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B. THE COST PLUS A PERCENTAGE CONTRACT

This form of contract involves the complication and expense of requiring that the government itself determine, or at least check with considerable accuracy, the actual costs to the contractor.

It enforces upon the government the necessity of supervising the contractual relations between its main contractor and his sub-contractors, for it is to the advantage of the main contractor to make his sub-contracts cost as much as possible.

It offers every inducement for the contractor to inflate his costs, and there are an almost infinite number of ways of doing this; the temptation

for the contractor is to inflate both his actual costs in every respect, and the cost he reports to the government.

Assuming that the above objections can be met, it has the advantage of protecting the government from excessive prices without demoralizing the prices and supply of raw materials, and of saving time.

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To summarize—this form of contract has the advantages of saving time and preventing demoralization of markets, but has the disadvantages of establishing a diversity instead of a community of interest between the government and the contractor, of involving the government in the expense and trouble of determining or checking contractor's costs, of supervising his relations with sub-contractors and of giving rise to contentions between the government and the contractor that may be very troublesome during the contract and for many years thereafter.

C. THE COST PLUS A LUMP SUM CONTRACT

In this form of contract the actual cost to the contractor, determined or checked by the government is paid to the contractor, plus a definite lump sum, which, in the judgment of the contracting officer, is a reasonable reimbursement to the contractor for the employment of his services, plant, and organization in producing the desired product for the government.

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Once this lump sum has been determined and accepted by the contractor, the contractor is under no inducement to inflate his actual costs, though he may still be tempted to inflate his reported costs to the government. His costs must therefore be determined or checked by the government as in "B," above. Neither is he under any inducement to keep his costs low—in short, in so far as the real costs are concerned, he occupies a neutral position.

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To summarize—this form of contract has the advantages of saving time and preventing demoralization of markets. It establishes neither a diversity nor a community of interests between the government and the contractor. It involves the government in the expense and complication of determining or checking the contractor's costs, and may involve some supervision of sub-contractual relations, although not so much as in "B." . . . . Assuming that the difficulties in determining the contractor's costs can be met, it appears to be a satisfactory form of contract.

D. THE COST PLUS A LUMP SUM WITH LIMITED PENALTY AND BONUS CONTRACT

In this form of contract a preliminary estimate is made by the contracting officer as in "C," or by the contracting officer and contractor in agreement. A lump sum consideration is fixed by the contracting officer as in "C," on the basis of the estimated cost. The contractor is informed of or agrees to the estimated cost and the lump sum consideration. If the actual cost

after the work is done is just equal to the estimated cost, the lump sum consideration is paid, exactly as in "C." However, if the contractor is able to reduce the actual cost below the estimate, any reduction is shared half and half between the government and the contractor, provided that the contractor shall not receive more than a certain maximum. On the other hand, if the actual cost exceeds the estimate, half the excess is carried by the government and the other half is deducted from the lump sum compensation that was the basis; provided again, that the contractor's profit shall not be reduced below a certain minimum.

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In this form of contract the contractor is again put practically on a salary and rental basis, but with a penalty and bonus provision that brings about a community of interest between him and the government, so safeguarded that unduly excessive profits to the contractor are prevented and also so as to ensure that he neither loses money on account of his work for the government nor finishes without any compensation whatsoever. The contractor has every reason to reduce his actual costs, and so far a community of interest has been established. On the other hand, he has the temptation of inflating his reported costs to the government. It will therefore still be necessary for the government to check or determine costs, as in both "B" and "C."

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To summarize—this form of contract saves time and prevents demoralization of markets. It establishes a community of interests between government and contractor. It involves the government in the expense and trouble of determining or checking contractor's costs, but involves no supervision of sub-contractual relations, since the contractor's interests and the government's are identical so far as keeping down costs of subcontracts are concerned. Assuming that the difficulties in determining contractor's costs can be met, it appears to be a satisfactory form of contract.

The first group of contracts for the construction of our newest navy, as entered into by the Navy Department, is the cost-plus-ten-per-cent-profit style of contract. In view of the fact that, as has just been indicated, this contract has been regarded as perhaps the least desirable of the three kinds of cost-plus contracts, from the government point of view, it may be asked why the Navy Department entered into a cost-plus-ten-per-cent-profit contract in preference to a fixed-profit-on-a-sliding-scale contract. The answer to such a question is complete and twofold: First, the cost-plus-ten-per-cent-profit contracts were formally entered into in April, 1917, and actually were agreed upon by the middle of February, 1917, before as much was known of the relative advantages and disadvantages of the different kinds of practicable

contracts as is now known. Second—perhaps the more important reason of the two—the policy of the Navy Department at that time made the cost-plus-ten-per-cent-profit contract preferable to all others—in fact, made its adoption inevitable.

VI

Governance is one of the most difficult and delicate arts in the world. In its last analysis, the tools and instruments of administration are persons—hence, machine action can never be counted upon from them. In all important situations, the psychology of human beings must be considered. Governance can, therefore, never be a science, but must ever remain an art. It is hoped that the expression of these facts here will not be found platitudinous in considering the reasons for the adoption of the types of contracts entered into by the Navy Department with the shipbuilders.

For many years past, the orders placed by the Navy Department with the principal civilian shipyards for the construction of naval vessels had furnished the very backbone of the "old-line" shipyards' business. Such orders enabled the shipbuilders to stabilize their laboring force, to assure sub-contractors of a reliable market for fabricated articles entering into naval vessels, and to constitute a steady demand for the producers of raw materials. Such orders have been a financial guarantee to the stockholders of the respective shipbuilding companies, since they represented work upon whose completion no such thing as a bad debt existed out of all of the millions involved, because the debtor was the United States Government itself. It will thus be seen that the shipbuilders owed a particular responsibility to the Navy Department and, in fact, owed a very great and very particular debt of gratitude to the Navy Department because the department had enabled the shipbuilders to carry on their business in good times and bad times alike.

On the other hand, the maintenance of an efficient shipbuilding industry was of primary importance to the Navy Department, and to the nation. Commerce, industry, and agriculture itself, are alike dependent, directly or indirectly, upon the ships that sail the seas. While our interoceanic commerce-bearers are usually spoken of as negligible in quantity, they are so only relatively to the seagoing vessels of certain other nations and relatively to

the vast quantity of goods transported overseas from this country. Actually, the interoceanic tonnage of this country is very great. More important is the fact that our coastwise trade is, by law, carried on in our own bottoms and that these bottoms are, by law, made in America. For the construction of these vessels, a sound shipbuilding industry is essential. It is vital, therefore, that the government, which is only the people itself, should take the necessary measures to sustain, at all times, an adequate shipbuilding industry. As part of this industry, it is necessary that men-of-war should be built sufficient in number and size and quality to sustain and protect the national policies in all parts of the world.

In harmony with these ideas, it is vital for the Navy Department to make sure that the price at which naval vessels are built for it by civilian shipbuilders should represent not less than the actual cost, not less than a reasonable profit. While the Navy Department uses records of costs secured in the course of the construction of men-of-war at navy yards to check up and to correct the claims of civilian shipbuilders, yet, at the same time, it uses the navy cost-records to justify its allowance to civilian shipbuilders of such price as may be agreed upon. In the case of the policy of the cost-plus-profit contracts now before us, the Navy Department believed it to be necessary—particularly in view of the national and international emergency then existing—to make such arrangements with the shipbuilders as fully to protect the government, and not less fully, to protect the interests of the shipbuilders. Even more, it seemed necessary to err, if at all, on the side of liberality to the shipbuilders, in order that the work might proceed with the utmost possible dispatch and with the utmost cordiality of feeling.

VII

Having in mind the above outlined considerations as to the protection of the government's interests, and, per contra, the considerations as to the protection of the shipbuilders' interests, the Navy Department, so far as concerns the construction of new vessels, entered into contracts on a basis of cost-plus-ten-per-cent-profit. These contracts are of a sort that any disinterested person must concede to be not illiberal toward the shipbuilders. The terms of these contracts allow as actual costs various items which, under ordinary circumstances, are considered only as proper

charges against a profit and loss account, and, hence, not reimbursable to the shipbuilder or manufacturer. Some of such items are interest, rent, selling expenses, and taxes of all kinds, excepting those imposed by the United States Government. By the terms of the contracts, the cost of these items, plus ten per cent thereof, must be allowed as part of the compensation to the shipbuilders.

It must be understood that the cost-plus-ten-per-cent contract was entered into only after very extended discussion between the Navy Department and the "old-line" shipbuilders, and between both of these groups and the proper committees of congress. If anyone should care to investigate the matter, he would find innumerable pages of discussion published in the Hearings of the Committee on Naval Appropriations, House of Representatives, of the Session of 1915-1917. He would there find that the shipbuilders proposed that a contract be entered into on the basis of the actual-costs-plus-sixty-five-per-cent of the direct labor—this sixty-five per cent to cover overhead and profit. So evident is it that the adoption of this method would have immensely simplified the tasks of the government in checking costs—since much of the contentious question as to what is or what is not overhead would have been removed—that one may well wonder why this arrangement was not at once agreed to by the department. There were various reasons of policy, as already referred to, but, in addition, there was the fact that the shipbuilders, for the most part, were unable to make clear to the Navy Department how much of the sixty-five per cent was profit.

The above circumstance is not so remarkable as one who has not had actual experience with the accounts of even the largest corporation might imagine: I think it is not too much to say that it is only the unusual company which has an accounting system satisfactory to anyone but itself, or which can clearly show to outsiders or even to its own officials what are or what are not the actual costs of its own product. The hearings above referred to would make clear to anyone who should read them that the Navy Department and the shipbuilders' discussions were at cross purposes, or, at least, that their points of view could not, at that time, be made to harmonize as expressed in the terms of any other form of contract than the one finally adopted: viz., contracts upon a basis of actual cost plus ten per cent profit thereon.

It is worth while noting that the cost-plus-ten-per-cent-profit form of contract soon gave way to the cost-plus-fixed-profit form. As a matter of fact, only a relatively few of the total number of vessels have been constructed under the all-inclusive cost-plus-ten-per-cent form—by far the larger number are now being built under the superior cost-plus-fixed-profit form. Of this, more hereafter.

VIII

Examination of the terms of a contract for the construction of ships on a basis of cost-plus-profit will show that the Compensation Board, as representatives of the Navy Department, is charged with four distinct sets of duties. The first duty is that the Compensation Board shall control the method of checking costs and shall ascertain the correctness of such costs. The second duty is that it shall satisfy itself that the prices charged by the shipbuilders for material are the lowest possible market prices obtainable, having in view the necessity for speedy delivery and the necessity for the delivery of material of the proper quality and quantity. The third duty is to determine what additional facilities a shipbuilder must have to carry out naval contracts and to allow the expenditures necessary to construct such facilities or a part of them. The fourth duty is to appraise the value of such facilities after the completion of the contracts.

It will be evident that when scores of naval vessels are being constructed with the utmost possible dispatch and when expenditures will eventually run considerably over $1,000,000,000, the Compensation Board, having its headquarters in Washington, can itself do no more than supervise and decide upon the actions necessary to keep account of costs. The task might have seemed almost insuperable except that the navy had already within its organization various agencies which could at once be employed upon matters of cost inspection.

Line officers of the navy skilled in steam-engineering have often been pioneers in all matters connected with marine engines and propelling machinery for vessels. The constructors of the navy are not approached by any part of the civilian world in their knowledge of ship design and of the actual construction of ships. The civil engineer officers of the navy stand, in regard to all phases of civil engineering, in the same position as do the naval

constructors in regard to ship construction and the navy engineers in regard to propelling machinery. The fourth group of officers in the navy possesses a kind of knowledge even more necessary for the proper conduct of cost inspection. Indeed, without such knowledge, cost inspection could not be conducted. This knowledge is that of the officers of the Pay Corps of the navy in regard to prices of material, handling of material, and cost accounting.

Thus already equipped with superintending constructors, with inspectors of machinery, with civil engineers, and with cost inspectors, the Compensation Board was ready to proceed with the establishment of a proper procedure for cost inspection. At each of the shipyards concerned, the officers above referred to were formed into a Cost Inspection Board. The respective Cost Inspection Boards are the instruments through which the Compensation Board works—the Compensation Board has no direct communication with the respective shipbuilders, except as such shipbuilders may personally present themselves in the office of the Compensation Board for information.

At the respective shipyards, the supervising civil engineer is not a member of the Cost Inspection Board, but is a member of a subsidiary board, known as the Plant Board. Each Plant Board is made up of a supervising civil engineer and of the resident cost inspector, this Plant Board being responsible directly to the local Cost Inspection Board, and thence to the Compensation Board.

It is to be observed that the superintending constructor is responsible for matters relating to fabrication of hulls of vessels; that the inspector of machinery is responsible for matters relating to the machinery of vessels; that the civil engineer (as a member of the Plant Board) is responsible for matters relating to construction of buildings, building ways, etc., and that the cost inspector is responsible for matters relating to the actual inspection of costs and to the proper records and reports appertaining thereto. Each of these officers is responsible for his own group of work, but each accepts the information acquired by the others as being as authentic as his own. They meet together for final settlement by themselves, sitting as a Cost Inspection Board, of such matters as can be agreed upon, or for making final recommendation from themselves, as a Cost Inspection Board, to the

Compensation Board at Washington, which latter board is the final board of decision.

Observe, also, that each of the members of the Cost Inspection Board has a competent office force. The persons attached to the offices of the superintending constructor and inspector of machinery are skilled draftsmen, and similar persons, suitable for design and inspection of hull material, or of machinery material, as the case may be. Of particular interest is the constitution of the cost inspector's office. His officer-personnel includes several assistants who have lately been certified public accountants or have had similar experience, and also includes the usual clerks who have had experience in the accounting offices at the navy yards. The force also includes "outside men," competent to investigate, on the spot, such matters as require correction in relation to the number of laborers that may be employed on a given job, or in relation to the methods of handling material intended for use in government work.

The Compensation Board has necessarily worked through its agents, the Cost Inspection Boards. The performance of duty of these officers has been beyond praise. To their resourcefulness, persuasiveness, and pertinacity, to their resolution and intelligence, the success of cost inspection is largely due. The success of cost-plus-profit contracts depends upon the efficacy of inspection of costs. In the rigorous and thorough-going character of its cost-inspection the navy has been notably fortunate.

IX

It is worth while emphasizing here that the only kind of cost-plus contract under the cognizance of the Compensation Board is the cost-plus contract for the construction of new naval vessels. This kind of contract is under the cognizance of the Compensation Board, but the organization of the cost inspector's office, the details of the accounts kept, and all similar matters, are handled by the Bureau of Supplies and Accounts. The officers of the Pay Corps concerned have, also, the same responsibility to their bureau in regard to the technic of their profession as the superintending constructor and inspector of machinery have to their respective bureaus.

Cost inspection under contracts for repairs to naval vessels, for repairs to vessels seized from the enemy, for repairs to

merchant vessels taken over as naval auxiliaries, for the manufacture of ordnance material, for the manufacture of aeroplane parts, for the manufacture of machinery, or for any other repair or manufacturing purposes, is not under the Compensation Board. Cost inspection under contracts for repairs or manufacture—as distinguished from contracts for the construction of new naval vessels—is under the cognizance of the Bureau of Supplies and Accounts and the Bureau of Construction and Repair, the Bureau of Supplies and Accounts and the Bureau of Steam Engineering, and the Bureau of Supplies and Accounts and the Bureau of Ordnance, as the case may be.

So far as the observance of correct accounting principles is concerned, and so far as ease and simplicity in their operation go, the form of the contracts for manufacturing work is greatly to be preferred to the form of contracts for the construction of new vessels. The cost-inspection of manufacturing contracts has been carried on with the same success as has attended the cost-inspection for the construction of new vessels. Since, however, manufacturing contracts are not under the cognizance of the Compensation Board, the details need not be dwelt upon here. It should be borne in mind, however, that the Bureau of Supplies and Accounts is conducting cost inspection at several hundred manufacturing plants and that such work is distinct from the work of the Compensation Board.

X

The instructions of the Compensation Board to the various Cost Inspection Boards, as approved by the Secretary of the Navy, do not prescribe a standard system of cost-accounting, nor do they authorize, strictly speaking, the keeping of a cost-accounting system by the cost inspector. The terms of the contract provide "that no changes in the methods or principles of keeping account of costs shall be required, provided the department finds such principles and methods adequate for the determination of actual costs." Unless, therefore, there is found, from time to time, charges against the government account that prevent a true record of costs being kept, no change is made.

This acceptance by the government of the shipbuilders' methods and principles of keeping account of costs was necessary, in the first place, because the upsetting of the shipbuilders' cost-account-

ing system would have made very grave financial and industrial confusion in the shipbuilders' works, and, in the second place, because of the fact that the government did not have at hand a standard cost-accounting system entirely applicable to civilian shipyards. The standard navy-yard cost-accounting system is complete and works efficiently—it is complete but not entirely satisfactory to the officers of the Pay Corps of the navy, because of the fact that the peculiarities arising out of the government's system of appropriations prevent a thoroughly satisfactory navy-yard cost-accounting system being established. As a consequence, since, up to the date of the establishment of cost inspection, the navy had not been concerned, except indirectly, with the cost-accounting systems at private shipyards, a standard system was not at hand that could be established at private shipyards without delay. However, the decisive consideration in this matter was the one first named, viz., that to establish a new cost-accounting system in the shipbuilders' yards was to produce, for a vital period, very grave financial and industrial confusion in the shipbuilders' plants.

On the other hand, the experience gained by the officers of the Pay Corps of the navy from their handling of navy-yard cost-accounting systems had thoroughly equipped them for the understanding of cost-accounting in general. Hence, while the cost-accounting systems at the different civilian shipyards are almost as numerous as the shipyards themselves and while some of them cannot be said to be satisfactory even to themselves—yet none of these systems has presented any mystery to the understanding of the Cost Inspection Board concerned.

The Compensation Board, under the instructions of the Navy Department, therefore, authorized the Cost Inspection Boards at the civilian plants to carry out what it denominated as a selective and corrective check of the contractor's records of costs and of the actual physical transactions he carries on. In other words, the government expressly avoids duplicating the shipbuilder's cost-accounting records. What it does is to have full access to all the cost records, as well as to the physical operations, of the shipbuilder, and to check up by an extensive system of selected matters the correctness of his whole procedure, and to correct by this selective check such inadvertences in the shipbuilder's records or methods of procedure as may be discovered.

XI

In order to expedite the construction of naval vessels, it was necessary that practically all the shipyards concerned should greatly increase their plants—both buildings and equipment. At once, the shipbuilders pleaded financial inability, or, at least, financial difficulty in furnishing such plant extensions at their own expense. So far as such are concerned, the Navy Department has, therefore, entered into various interesting arrangements.

If the plant extension or equipment desired by the government is of a sort likely to be necessary for the shipbuilder's use in the ordinary conduct of his business in ordinary times, then the Navy Department pays the shipbuilder, as fast as he makes the expenditure, *not to exceed fifty per cent* of the cost. This class of allowances is known as Special Rentals "A."

Five important points are to be noted in this Special Rentals "A" class. *First,* no depreciation on this class is allowed the shipbuilder, the special rentals rate being in lieu of all depreciation. *Second,* owing to the requirements of the laws governing government appropriations, the value of such special rentals is recorded as a part of the cost of the vessels; for example: if the shipbuilder builds an extension to his foundry at $100,000, the government may decide that only twenty per cent of that amount is due to the government's specific requirements; hence, the shipbuilder must pay $80,000 from his own funds and the government will pay him $20,000 in addition, thus making up the $100,000. Therefore, if there are twenty vessels of equal value building at the shipyard, the cost of each vessel will be increased by $1000. *Third,* at the expiration of the contract, the government reconsiders its rate of allowance, and, if equity demand, pays the shipbuilder more or less of the special rentals value, or "stands pat" in the matter. *Fourth,* the title to this sort of plant extension becomes vested in the shipbuilder, and not in the government. The *fifth* point to be noted under the head of Special Rentals "A" is that *no profit* is allowed the shipbuilder upon expenditures made under this head.

If the plant extension or equipment desired by the government is of a sort *not* likely to be necessary for the shipbuilder's use in ordinary times, then the Navy Department pays the shipbuilder, as fast as he makes the expenditure, the full amount of such expenditures. This class of allowances is known as Special Rentals "B."

Four points are to be noted in regard to Special Rentals "B": *First,* no depreciation is allowed. *Second,* the value of such rentals is carried *in toto* into the costs of the vessels concerned. *Third,* at the expiration of the contract, the government takes title to the property, but the government gives the shipbuilder the option of acquiring title to the property at an agreed-upon price. If the shipbuilder does not offer a price satisfactory to the government, the property remains the property of the government. *Fourth,* no profit is allowed the shipbuilder upon expenditures under Special Rentals "B."

Under the act of October 6, 1917, additional plant facilities were authorized. These are of the general nature of Special Rentals "B," *i. e.,* their full value is payable by the government to the shipbuilder. However, two important differences are to be noted. *First,* under no circumstances is the value of such plant facilities charged as part of vessels. *Second,* the title to property of this nature vests in the government.

Recapitulating, then, this part of the Navy Department's arrangements to finance the shipbuilder, we find that plant extensions are financed thus: *First*—Special Rentals "A"—a fifty per cent allowance, or less, to the shipbuilder, of the value of the property, the title to the property vesting forthwith in the shipbuilder; *second*—Special Rentals "B"—a one hundred per cent allowance to the shipbuilder, the title to the property vesting in the government, but the shipbuilder having the option of purchase from the government; *third*—Plant Facilities under act of October 6, 1917—a one hundred per cent allowance to the shipbuilder, but the title to the property vesting definitively in the government.

XII

Bills covering reimbursement by the government to the shipbuilder for expenditures made by him for material, labor, indirect expense, and to cover his profit, are made monthly. Such bills are made up at the shipyard, certified to by the local Cost Inspection Board, then forwarded to the Compensation Board at Washington for review. The board, if satisfied with the bills, then recommends to the Secretary of the Navy that they be paid. After receiving the signature of the Secretary of the Navy and of the chiefs of the Bureaus of Steam Engineering and Construc-

tion and Repair, they are sent for payment to the disbursing officer of the Cost Inspection Board concerned.

It is evident that if payment were made to the shipbuilder only on his monthly bills, he would always have large amounts of money due him from the government, and, hence, would have his available supply of liquid capital much "tied-up" at any given time. To obviate this difficulty—to pay the shipbuilder with the utmost promptness—preliminary payments are authorized to be made on the spot. The shipbuilder can present a material invoice or a labor roll to the local cost inspector, certify that he has actually made the expenditures, and receive reimbursement forthwith from the disbursing officer detailed by the Bureau of Supplies and Accounts for duty with the local Cost Inspection Board. The shipbuilder is actually paid large sums almost every day within four or five hours after he presents his bill, if he so desires.

The next step authorized by the Navy Department to finance the shipbuilder was to make reimbursements to him for progress payments made by the shipbuilder to a sub-contractor. Warrant of law for the making of partial payments had been granted by the act of March 4, 1911, but such warrant had not been utilized to its full extent. Under the cost-plus contracts, however, this law has come to a wide range of usefulness. For example: five boilers are ordered by shipbuilder, A, from sub-contractor, B. When one boiler is finished but not yet delivered, a navy representative certifies to the local Cost Inspection Board that the boiler appears to be satisfactory. Payment is thereupon immediately made by A to B for the one boiler, even although it may remain undelivered indefinitely, and reimbursement in the proper sum is made by the navy to A.

The next method of assisting in financing the shipbuilder was authorized by a recent act of congress—Urgent Deficiency Act of October 6, 1917. Under the power of this law, the Navy Department has authority to advance to contractors any amounts up to thirty per cent of the value of the contract. Thus, if the shipbuilder makes a contract with a boiler manufacturer in a total amount of $90,000, the shipbuilder can advance to the boiler manufacturer the sum of $27,000, and the Navy Department will immediately reimburse the shipbuilder the $27,000. However, in order that this privilege may not be abused, the prior authority of the department is necessary for each specific sub-contractor.

Also, the sub-contractor is usually required to furnish sufficient security.

Finally, under the act of October 6, 1917, already referred to, the department has authority to make advances to the amount of thirty per cent of the value of the contracts made with the shipbuilders. Thus, if a shipbuilder had a contract for building one hundred ships at $1,000,000 apiece, or $100,000,000, the department could advance $30,000,000 on such ships. In no case, however, although it has advanced several million dollars to the respective shipbuilders, has the department found it necessary to advance even half of thirty per cent.

XIII

In the early autumn of 1917, an interesting development of the "cost-plus" idea took place. The act of October 6, 1917, made available a considerable sum of money for the construction of additional vessels. It was decided that these vessels should be built on a cost-plus-fixed-profit basis, with a bonus privilege. As intimated in the earlier part of these remarks, where the recommendations of the Inter-Departmental Conference were referred to, a cost-plus-fixed-profit arrangement, supported by a bonus-or-penalty-clause, is the best of the possible forms of cost-plus contracts.

In regard to cost-plus-ten-per-cent-profit contracts, there was once current a rather harsh saying: "The more the contractor spends, the more he gets." Owing to competent cost-inspection, this saying has never been meant to refer to navy work, but has been applied in other directions only. It means, however, that the higher the value of the contractor's costs, the greater the sum of money paid to him as profit, since, by the contractual terms, he must be paid as profit ten per cent of his costs. In the cost-plus-fixed-profit contracts, quite a different result ensues. The more the shipbuilder spends, the less profit he gets. This happy condition arises from the bonus privilege referred to.

A concrete example, based on the existing form of cost-plus-fixed-profit contract, will make this point clear. The Navy Department and the shipbuilder agree upon the estimated cost of a vessel—say $1,200,000. Upon this, the Navy Department agrees to pay the shipbuilder a fixed profit—say $120,000. If, however,

it is found, upon completion of the contract, that the vessel has actually cost only $1,000,000, then the shipbuilder receives one-half of the "savings," in addition to his fixed profit. In this example, then, the "saving" below the estimated cost—that is, the difference between $1,200,000, and $1,000,000—being $200,000, the shipbuilder receives one-half of the $200,000, or $100,000, this being in addition to his fixed profit of $120,000. Hence, his total profit on the vessel will be $220,000. It will be seen that, by this kind of contract, the shipbuilder is keenly stimulated to economy in production, quite unlike the cost-plus-ten-per-cent-profit contracts. Thus, the cost-plus-fixed-profit-with-bonus contracts may be expressed in a formula: "the less the shipbuilder spends, the more he gets."

Of course, it would be a still more economical arrangement if a penalty feature were embodied in the present contracts, that is, if the vessel exceeded the estimated costs, the shipbuilder's profits should be cut down by one-half the overrun. This would be a move toward an ideal contract. However, the country does not yet seem to have achieved a state of mind to make this ideal form feasible.

It is a clear indication of the great progress in mutual understanding made possible by the stress of war that, in the relatively short period from April, 1917, to October, 1917, the shipbuilders were willing to shift from the original all-inclusive cost-plus-ten-per-cent-profit contracts to the present vastly more economical cost-plus-fixed-profit-with-bonus-for-savings contracts. They have come to a fuller realization than ever before that they are just as much a part of government as are those of us whose particular duty it happens to be to administer the people's affairs and to see that the laws of the people are carried out. If business men act for the government they act for themselves. If government is ruined by reckless expenditures, business men are ruined. The consequences of defeat in this war would be as hideous to business men as to government. The interests of one are the interests of the other. They cannot be separated. They are the *same* interests. I venture to think that the work of cost inspection, almost as much as any other one thing arising out of this war, has enabled the business world to acknowledge—let us hope forever!—these inexorable truths.

XIV

The savings to the government effected by cost inspection have been very great. Only the merest glance can be given to them here. Amounts saved at the respective "old-line" shipyards, by the correction of actual errors, run from $10,000 to $100,000 each month. While the actual number of shipyards under the cognizance of the Compensation Board cannot be named here, yet the fact may be accepted that the direct savings thus made already aggregate several hundred thousand dollars.

The prevention of the accumulation of improper costs, made possible by the rigorous scrutiny given the shipbuilders' records by the local Cost Inspection Boards, has resulted in economies almost incalculable.

In addition to keeping down costs in the manner above indicated, the Compensation Board has been able to make savings of great sums by negotiations conducted direct from its own office. Lower prices for material than prices first offered have often been secured on large items. In more than one case, as much as a million dollars has been struck off from the price of a single class of equipment.

Various decisions made by the Navy Department, after consideration of recommendations presented by the Compensation Board, have attracted great attention throughout the country. Among these may be mentioned a ruling that bonuses paid by the shipbuilders to officials of their companies cannot be accepted as charges against naval vessels. Of even wider application, is the ruling that no part of federal taxes—income taxes, excess profit taxes, munitions taxes, corporation taxes—paid by the shipbuilders can be reimbursed to them by the navy. Such rulings as these have saved the government very great sums of money, and have prevented inflations of a sort whose deteriorative influences on our national economy might have been almost illimitable.

The time is not suitable for giving more details of the great success of cost inspection. An account of notable results may be permissible in the future. But that the Navy Department's policy has been amply justified in the securing of good-will on the part of shipbuilders and on the part of their employees, to the end that expeditious construction of vessels has been effected, let the commanders of our constantly augmented fleets testify.

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SOME NOTES ON TRAINING MEN FOR CLERICAL AND COMMISSARY RATES

By LIEUT. COMMANDER K. C. MCINTOSH, P. C., U. S. Navy

At this time, when every officer in the navy has been busily training and rating men for over a year, it way seem presumption to attempt any dissertation on the subject of schooling methods. Every supply officer, however, has had difficulties in gauging the amount of instruction which men newly transferred to his department have received; and the school orders leave a great deal of latitude in the matter of what method shall be used to carry out the indicated syllabi. The class-room method is in many ships impracticable of application, and is not entirely satisfactory, as it is possible for a man to recite his lesson perfectly and yet be utterly unable to apply it to actual practice. The so-called "striker method" also has drawbacks. Many a man rated in a pay office has made a dismal failure as a captain's writer, and many an engineer's yeoman has been disrated on transfer to the g. s. k. Particularly lacking is a uniformity in the training of storekeepers, some ships considering that the rating is practically synonymous with yeoman, and others rating storekeepers on the strength of their ability as jack-of-the-dust. As for the commissary branch—stewards and cooks are as hard to pick out as a new razor; and officers' servants are like plenty of sugar—old-timers remember seeing them, but have to stop and think just where it was.

The methods hereafter detailed were applied on board U. S. S. *Kansas* during the summer of 1917. That vessel had been assigned a quota of trained men for transfer in March, 1918. As a result of these methods, the *Kansas* quota of yeomen was completed in September, 1917, the quota of cooks had been exceeded by that time, and in addition five commissary stewards had been

rated, besides a few officers' servants. Effort was made to get a line on the subsequent records of these men after transfer, and it is believed that they made good without exception. On subsequent duty in the Transport Force, two *Kansas*-trained men were the nucleus and backbone of the new organization, although the duty was totally different in character from anything they had seen in the fleet.

YEOMEN

As a rule it is hard to tell from a man's previous experience and general appearance whether he is a likely applicant for the rating of yeoman. Special adaptability for other ratings is normally more or less evident in the candidate's bearing, language and former duties. A good or a bad yeoman is the possible product of training of almost any type of man that we find, from the college trained and muscular athlete to a somnolent and almost slovenly man who has never even reached high school. Luckily, however, ability or lack of it in this line will declare itself very early in the course of training and little time is thus wasted on unprofitable material. No candidate should be refused a chance on account of appearance, bad grammar, or poor handwriting, as long as he can make legible figures. On the other hand, the most likable-appearing youngster should not be bothered with, if his deck division officers cannot give him a reputation for willingness.

From the beginning of training, classes should be held not less than twice a week. Study for this school period should be confined to the Bluejacket's Manual until "A to N" has been thoroughly covered; thereafter "Y 1, 2, and 3" may be supplemented by chapters of the regulations. The candidate should be assigned to one of the ship's offices for a week, with special instructions to familiarize himself with the forms there in use, and given all the typing to do which he can handle. At the end of the week, the yeoman in charge of the office furnishes a report, not on the candidate's prowess, but his *ability and desire to learn*. He should then be moved to another office for a further period of a week, then moved again. An unfavorable report by two of his first three yeomen-in-charge should terminate his instruction and chance of rating. When possible, the best results have been found to follow when the first week is spent in the engineer's log-room, the second in the ordnance office, the third in the executive

office, and the final training in the pay office or g. s. k. During this period of office instruction, the candidate is not to be made a messenger-boy, neither is he exactly a striker; in that he is additional to the regular yeoman-and-striker complement of the office, and is given work in that particular line even when the regular office force has cleaned the desk. The main idea is to crowd as much typing and acquaintance with as many blank forms into his first month as possible. If he is temperamentally fitted to become a valuable yeoman, that first month will give him a surprising amount of knowledge in these two lines, and best of all will *show him so clearly what he does not know* that he can practically instruct himself from then on. The second month, he should be permanently stationed as a member of some ship's office force. There will always be room for him—no navigator, ship's writer, first lieutenant or pay officer ever has too many men in his office. At the end of two months, you will have a much better third-class yeoman than can usually be made in six months in any one office in the ship or by the class-room method only; and on transfer, the man will have a far better chance of making good in whatever office he may be placed. The particular job which was found to get greatest results in the second month of training is the commissary-record desk in the pay office. Beside involving the use of a great many forms, it also includes the checking in of stores, preparation of surveys, keeping of stock-sheets, and best of all will plainly and immediately indicate any desire to put off "finishing up the job" until to-morrow. The commissary desk must be clean every night or there is immediate and apparent trouble; and moreover, it is the easiest bookkeeping desk in the ship for the officer in charge to check up quickly and accurately.

STOREKEEPERS

Not every man who applies for training as storekeeper will be found worth attempting to train. There are many exceptions; but as a rule, if there is any promise in him, the candidate should have sufficient physique to shoulder a bag of potatoes without getting red in the face and mental quickness to enable him to get rid of a fairly lengthy example in long division in reasonably short time. These two simple capacity tests will remove an amazing number of otherwise promising applicants. Storekeepers must be husky enough to spend most of their time below-decks without

injury to their health, and should temperamentally be of the so-called "scatterbrain" type—any knowledge of any sort to be a thing they will strive for, and learning any new thing in any line a genuine pleasure. Their knowledge of blank forms need not go much beyond invoices, bills-of-lading, stubs and stock-sheets and cards; but the genuine, born storekeeper is unhappy as long as one article rests in the issue room for which he does not know the name and use. A man who applies for a job as storekeeper with *fresh* paint spots on his clothing, with long hair, or with broken finger-nails, may develop into a good record keeper, but will always require driving to keep his stock well sorted and carded. In training applicants, practically all the stress should be laid on nomenclature and care of stock. Bi-weekly classes in "A to N" should be held, with the Bluejacket's Manual for text-book; and it will usually be found that the embryo storekeeper will beat the prospective yeoman badly at that game. For the first month of training, storekeepers should be successively attached to the gangs of the fireman, electrician, gunner's mate and carpenter assigned to the supply division. Once a week a pile of miscellaneous "small reckonings" should be assembled in the survey-room without labels, and the candidates required to name them, define their use, and the best methods of stowing and preserving them. Make the acquisition of stock-keeping lore a competitive game. Finally, as a small psychological aid to efficiency—provide every storekeeper you have with a chest for his clothing as near his job as possible without actually being in the store-room. If chests are not allowed, try to get him a locker. It is part of the successful storekeeper's temperament to hate slinging a bag as the devil hates holy water. Why, I cannot say, unless it be that it offends his ideas of visible and accessible stowage.

COOKS AND BAKERS

The first thing to find out about a man who asks for a job as galley-striker is "Can he stand it?" Galley decks are normally dry only twice a day—just before first lieutenant's daily inspection and just after shifting watches at one-thirty or thereabout. The air is surcharged with steam at least ten hours a day, and the temperature shifts suddenly and violently. Even a thin cook should be deep-chested and thick-necked; while as a general rule

it requires a muscular and stringy man to stand the heavy lifting and intense heat of the ship's bakery.

The next requirement enters the realm of pure psychology—has the applicant a bad record, and why? If he has been passed from one division to another by irritated division officers, if his record shows many warnings at the mast or even a court or two for "talking back to petty officers," "surliness," "scrubbing clothes in unauthorized places," or "clothes in lucky-bag," take him, Mr. Supply Officer, take him quickly before he adds A. O. L. to his crime sheet and is set ashore with a short ticket. You have your ideal cook-material; for you have found a man with the irrepressible artistic temperament, who will learn in two months to add his condiments accurately by instinct, to abominate a potato-peeling behind the range and to storm at a mess-cook with muddy feet. His progress depends entirely on the supply officer's ability to discover the particular manner of controlling him and to persuade the executive officer that he deserves rating in spite of his red-inked record. As for the former, no definite rule can be formulated. Each cook must be handled and catalogued separately; each one will have his own particular weak spot to be found and used. Eternal vigilance and diplomacy are the price of a smooth-running galley. In the writer's experience was one galley containing two first-class cooks. The junior was the sort who would work himself blind if complimented and "greased" a little. The senior, on the other hand, was the kind who required a periodical calling-down—a normally lazy man who could be irritated into a frenzy of cleanliness and good cooking by a carefully-placed minor criticism, but who would loaf and bask for a week in the warmth of one hearty commendation As cooks will, when of equal rating, these two quarrelled frequently, and together buttonholed the supply officer for "justice." To call down the senior and smooth down the junior while they were together and at the same time uphold the authority of the senior without placing the junior in a second- or third-class position was a job which the Versailles Conference might well have avoided; and the fact that that particular galley continued to go right is one of the proudest plumes in my professional bonnet.

Instruction of cooks and bakers, aside from actual galley striking, should be class-work, preferably lectures by the com-

missary steward, wherein each man is required to keep a recipe-book of a sufficiently legible character to permit examination once a week by the commissary officer; and the daily menu should form the basis of the daily study for a month. In that period, all the normal sea-going dishes will have occurred in some form or other, and the recipe-books may be completed by esoteric entries of roues, meringues, sauces, and so forth. Individual progress is easily noted by the commissary officer. If you come into the galley an hour before a meal and find a candidate of a month's training watching the cook-in-charge work, go immediately to the steward and ask "What's wrong with So-and-so?" If the cook-in-charge, having seen you approach, is found making dabs at the deck with a swab while the neophyte sprinkles salt on the pork-chops or opens the oven to watch the candying "sweet-spuds," your galley striker is making good.

To dilate a bit on the psychological side, if you can manage to have an uptake, no matter how small, turned over to the galley-force for a drying-room, "Provided they keep it clean, chipped and painted," and can obtain permission for them to use the wash-room for scrubbing during the dead hours of night, you will note a distinct reduction in galley quarrels and an increased pride in turning out good meals.

Sometimes a promising cook will suddenly "go wrong" in inexplicable fashion. That is nine times out of ten a case for the supply officer to cure personally. If he gets hold of the man, plainly states wherein he is "falling down," and demands a reason therefor without heat and reserving judgment, the reason is usually forthcoming in the form of a personal hard-luck story which may not have the slightest connection with the ship or with his work. One case in point was that of a man whose wife was very ill and begging him to come home. There was no reason why the man should not have leave; but he had not asked for it, because his record before he entered the galley had been bad, and he was afraid to make the request. "If I'd asked and not got leave, sir, I'd a-gone bugs and jumped ship. So I just didn't ask." Five days' leave and a special money requisition closed that incident, and within a year that particular cook had become the main-stay of the galley and was well on the road toward a steward's rating.

COMMISSARY STEWARDS

Of all ratings aboard ship, this is perhaps the most difficult to fill; and it is unfortunate that as a rule only cooks and bakers aspire to it. The ideal commissary steward should have all the qualities which go to make a successful yeoman, storekeeper and boatswain's mate as well. He must have a yeoman's accuracy, a storekeeper's eye for detail and love of work for result's sake, and a boatswain's mate's ability to get work out of men. More, he should be able to make men work fast and *cheerfully*—his working party should jump to his "Come on, Jack. Let's go!" with as much alacrity as follows the most stentorian "Bear a hand, there! On the run!" The prospective commissary steward should have a record that has been clean for at least six quarters and without any serious entries whatever; and he should never have been a failure in any job he has tackled. His previous duty is of small moment, provided it has been responsible duty and provided he has made good in it. Of six *good* commissary stewards trained and rated during the war by the writer, one was made from yeoman second class and one from gunner's mate first class. A candidate should never be rated until you would feel safe in placing your own mess in his hands—aside from almost certain trouble to other supply officers, you might get him back some day. His training should begin in the class-room, and he should be made to work hard. If he "makes a four" one day, increase his assignment for the next, until you have proved that he can remain unruffled and accurate under pressure of haste. This academic instruction should continue until he can sing the ration forward and backward, not only in terms of ration allowances, but issues for a meal in terms of so many hundred men, estimates for a week or a month and balances on provision requisitions. He should know all commissary forms thoroughly, and be able to keep a clean and accurate stock-book. He should have a fair and orderly knowledge of filing records; and should be made to work out every old provision return you have in your retain files. Don't raise your eyebrows—never let the steward keep *your* provision return; but make him keep *his*. Comparison of the two at the quarter's end will tell you more of your steward than fathoms of examination and talk. He should be able in two minutes to furnish documentary answer to such

questions as "What was the cost of ration on June eighteenth?" "How many pounds of spuds did John Smith deliver in August?" "How much milk did we use quarter before last?" and finally, "How many men went on liberty yesterday?" In addition, he should have a very complete recipe book from which he can recite from memory. Two months should be enough to acquire the above knowledge, voluminous and varied as it is; for it can be acquired in that time by strict attention to business; and any lack of such attention should at once remove the candidate from the school. In other words, he should feel *personally responsible* for his work and his progress from the very start, and realize that you have no time to be patient with him.

After his academic course, put him for two weeks in the galley under the most exacting first-class cook you have. This is his second point of test—if he is proper steward material, he will be able at once to apply his book-learned recipes to actual practice to the satisfaction of all concerned. If he can't, advise him to think about trying for yeoman instead.

Thereafter, his future is fairly assured, and the remainder of his training should be a week in the bake-shop, with special instruction in making yeast; a week actually in full charge of the ship's mess under the eye of the regular steward—who by the way, must be told never to offer advice unless something is actually done wrong—and two weeks at the commissary record desk in the pay office. Then you may rate your steward, secure in the knowledge that you have a good man if you keep him, and that you need not be ashamed to transfer him to the smartest ship in the fleet.

Other things being equal, pick as your candidate a man with a sense of humor. Never waste time trying to make a steward out of a chronic grouch. It can't be done.

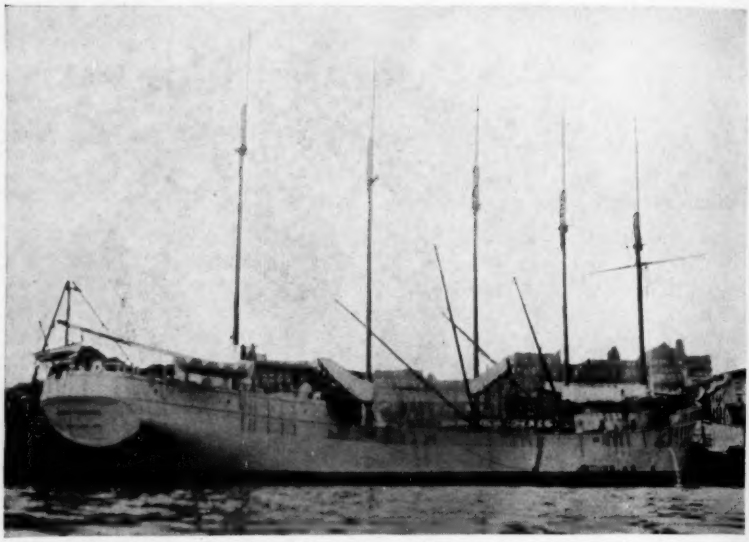
MESS ATTENDANTS

Officers' servants in the past have not been supply department ratings. However, the experiment has been tried in the fleet and pretty thoroughly worked out in the transport force, of placing all officers' messes under the commissary officer; and it is probably only a question of time before they are legally fixed there. Before the war, the supply of Filipino mess attendants was fairly adequate. We may hope it will be again some day;

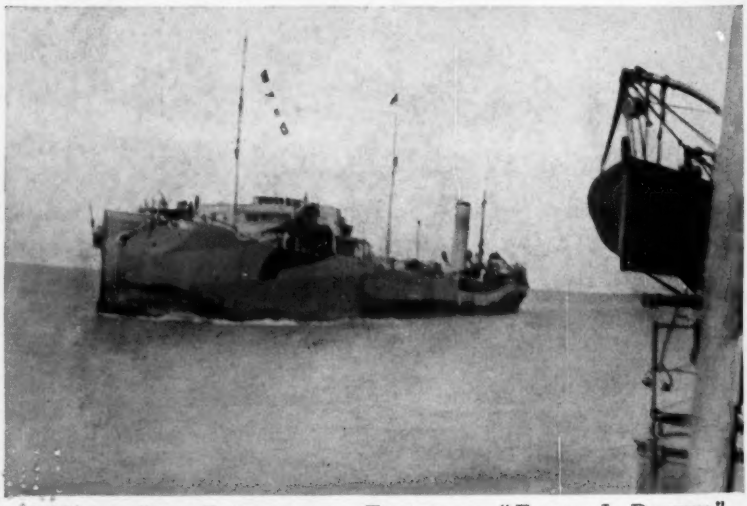
but that day seems distant. In the meantime we must continue to spoil good cane-cutters and mule-skinners by making servants of them. There is only one salvation for the officer who is charged with training and managing them—patience and the smile that will not come off. One must never forget that if the average mess attendant had a mentality above that of a normal ten-year-old, he would not be a mess-attendant, and one should govern himself accordingly. One must not be afraid to squat over a galvanized bucket and give a demonstration by example of the proper method of scrubbing an undershirt; and should make undershirt and sock inspection an invariable part of the day's routine. Light will break through the clouds suddenly in every case, and there is nothing cleaner than the mess attendant who has decided that he likes to be clean. Personal cleanliness must be made the first goal of effort; for without it, pride and cleanliness of work will never follow. There is but one general rule in the making of a servant—try to keep him smiling. If he complains that his turn for pantry-watch comes too often, tell him that " when I find a boy I can trust to stand a good watch,, I give him a lot of watches to stand." He is bound to do one of two things—either go away with his chest thrown out and a comfortable feeling of importance, or after a moment of looking blank see that you have caught him and burst into a whoop of laughter. In either case he stands the watch and forgets his troubles. Give him all the liberty and privileges that he rates—no more—but let him feel that each liberty is in some way a sugar-plum for a good boy. Be rigid and conscienceless in the matter of his clothes-bag—excuse nothing; but demand the last jot and tittle of the clothing regulations. (Note: Always *rub* the marks on a mess-attendant's blues. They may be put on with blanco instead of paint, and the same over-coat may thus do duty for five or six men for purposes of going ashore.) Wearisome as it will prove for several months, encourage them to bring you all their squabbles, both parties together. Let them talk it out and get excited over it in your presence. Before long you can convince them that they are both acting like fools, and the conviction may save some broken crockery in the pantry that night. If possible, make some arrangement with the executive whereby minor punishment for minor offences may be almost instantaneously inflicted. The Filipino mess attendant should be punished privately. The negro,

however, should be punished, if possible, in the presence of every other negro aboard ship. Unlike white men, the spectators will not "rub it in" to the unfortunate. They will perhaps bet him that "Dey'll nevah git me in dat fix," which is the state of mind most desirable to produce. And finally, never forget that the negro is a past master in the art of insinuation, and will in the most artless fashion try to make you laugh in your most Olympian moments of just wrath, and will deliberately attempt to lay up a store of good favor against an *offence he intends to commit some time in the future.*

But the Golden Rule in training men, is after all, to know each one of them as well as possible, to understand his individual likes, dislikes, strong points and weaknesses. You can easily do this without either undue familiarity or intruding on his privacy. And aside from enormously increased control of your department, you will find that the American bluejacket is a chap well worth knowing and from whom you yourself can learn a great deal.



THE FIVE-MASTED MOTOR SCHOONER "GENERAL PERSHING." SALVAGED BY THE "CINCINNATI."



A MODERN STEEL TANKER OF THE TYPE OF THE "EDWARD L. DOHENY."

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

YOUNG AMERICA

By COMMANDER STANFORD E. MOSES, U. S. Navy

The novelty in the narrative which follows centers chiefly in the youth and spirit of the men who did the work.

In one week they successfully floated two large ships which had gone ashore on shoals or reefs in the Straits of Florida.

This would have been nothing for experienced wreckers to do, with proper salvage equipment, but it was creditable seamanship for young men and boys, recruited largely from the mountains and prairies; many of them having seen salt water this year for the first time in their lives.

In giving help, as so often happens, they unconsciously received it in return. The week was one of practical instruction in the rudiments of seamanship. Handling ground tackle, running lines; lowering, hoisting and handling boats, and discharging cargo, became every-day, and every-night affairs. It was valuable training. Salvage operations may be expected to play an increasing part in the navy's work.

The rapidly increasing number of ships in the navy and mercantile marine should naturally increase the number of groundings, collisions and other accidents.

The rapid increase in the number of ships involves a corresponding expansion in the personnel, to man the fleets.

These conditions necessarily lower for a time the average skill of operating and handling ships, because of the comparative inexperience of many of the officers and crews.

Quick construction and limited periods available for inspection, test and trial tend to make the new ships less staunch and less reliable, on the average, than the peace-times ships of more deliberate construction and employment.

In European waters the primary causes of increased salvage work have been the unrestricted submarine campaign and the casualties of battle.

These causes, especially submarine attacks, may be expected to increase the scope of salvage work in the western Atlantic, the Caribbean, and Gulf of Mexico.

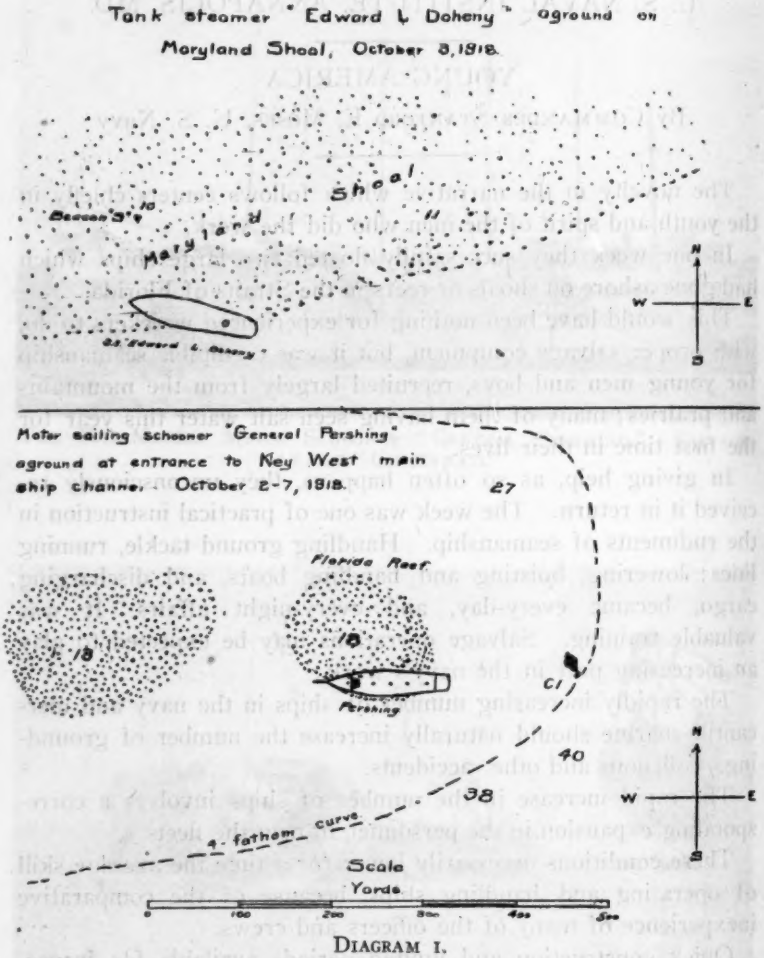

DIAGRAM I.

Naval vessels are not as a rule well fitted for towing and salvage operations, and their wrecking equipment, as compared with a modern salvage outfit, is primitive and ineffective.

But forethought will enable the tools available to be used more effectively, and this account of a week of salvage work may give

those who read it some ideas or suggestions of practical value in similar situations.

During the first week of October, 1918, while in command of the U. S. S. *Cincinnati,* I was placed in charge of salvage operations which resulted in successfully floating the five-masted motor schooner *General Pershing,* and the large tank steamer *Edward L. Doheny.*

Both ships were floated practically unharmed.

The *Cincinnati* was assisted by the *Albatross* and by the lighthouse tender *Ivy.*

The small tug *Peoria* also rendered some assistance, and submarine chasers *320, 189,* and *335* ran lines and handled lighters and men. The *Pershing* went aground October 2, and the *Doheny* October 3, within fifteen miles of each other; the *Pershing* on Florida Reef, 200 yards west of the entrance to Key West main ship channel; and the *Doheny* on Maryland Shoal, 50 feet south of the beacon.

Maryland Shoal is three and a half miles to the westward of American Shoal light, in the Florida Straits.

Both ships were aground on soft coral or sandy bottom, and heading west. The condition of weather, wind and tide and current were almost identical.

There was deep water on the port side, astern, and on both quarters of the *Pershing;* but only on the port side and port quarter of the *Doheny.* By deep water is meant sufficient depth to float the grounded ships and the ships engaged in salvaging them.

It is fortunate that these conditions were not reversed, because it was necessary to work on the starboard quarter of the *Pershing;* but not of the *Doheny.*

The first diagram shows the positions of the two ships when aground.

As the *Doheny* was a long modern steel tanker, aground forward and afloat astern, the task of floating her was quickly and simply performed when the proper time arrived, by pumping out forward and flooding the after tanks during the towing operations.

The *General Pershing* presented a much more difficult problem because she was drawing almost the same water, 20 feet, forward and aft, and her trim could not be readily changed.

In grounding she had driven, bows on, across one hummock and upon a second one, resting on both. The diver's sketch showing the result of his examination, suggested a ship's model resting securely on two saddles.

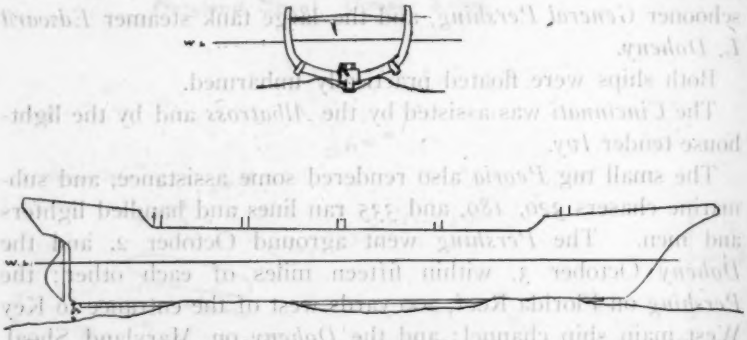

DIAGRAM 2.—Motor Schooner *General Pershing*, aground on Florida Reef. Drawing made from sketch submitted by diver, Chief Gunner's Mate Turpin, of the *Marblehead*.

The pocket shown in the sketch on either side of the vertical keel was probably caused by a nearly successful attempt to tow the stern off to port into deep water.

With two kedges out and three ships towing off the port quarter the *Pershing's* stern began to swing very slowly to port. Degree by degree the stern swung out two points, and the tidal current, increasing in velocity, set against the starboard quarter and added to the forces swinging the stern toward deep water.

Unfortunately the increasing tidal current also set one of the towing ships down upon the other two, which were towing in tandem, and she let go and ran clear.

With three ships towing, the forces were almost balanced. The sudden release of one of the tow lines allowed the *Pershing's* stern to swing back on the shoal, and her momentum ripped out the chock through which the tandem tow line was led, and carried away the towing bitts on the *Pershing*.

The ship swung back with sufficient force to stick. She could never again be swung in azimuth, but five days later was finally pulled directly astern and floated.

It is a part of this story to note that when the tandem tow line carried away on the *Pershing* it created considerable havoc.

Rigging and wreckage and splinters were flying. All hands on the *Pershing* ran to places of safety, except one man; or rather, one boy; a nineteen-year-old signalman named Velasco, who stood where he was—and he was in a very dangerous place—and signaled to stop towing. It was 1.00 p. m., October 2, when orders were received to proceed with the *Cincinnati* and *Albatross* to the rescue of the schooner aground near the harbor entrance.

The *Albatross* was then underway. The *Cincinnati* was underway forty minutes later, but stopped to get a wire towing bridle from another ship and arrived on the scene at 3.00 p. m.

The *Albatross* had already run a line to the *Pershing's* stern and hauled until the line parted; but without result.

The light-house tender *Ivy* came up, and rendered valuable assistance. A conference was held on the *Pershing,* attended by the commanding officers of all ships present.

Ensign Quinby of the *Cincinnati,* also attended this conference. He remained on the *Pershing* as wrecking master during almost continuous night and day work during the week that followed, and did excellent work, calling forth particular expressions of appreciation from the master of the *Pershing* in a letter of thanks addressed to the officers and crew of the *Cincinnati.*

Ensign Quinby—please remember the title of this narrative—was enrolled as a seaman second class, U. S. Naval Reserve Force, more than a year ago; but he had no seafaring experience before joining this ship, seven months ago.

At the conference on the *Pershing* it was planned to lay out kedges astern to keep the ship from working further on the shoal.

The tide had just begun to rise and the captain of the *Ivy,* with local knowledge, believed it to be advisable to begin towing at once, in the hope of hauling the ship off at that night's high tide.

This plan was tried, but failed.

Early the next morning, October 3, the work was begun of laying out kedges astern and on the port quarter of the *Pershing.*

The *Cincinnati's* sheet anchor was used as a stern kedge. The sheet chain was unshackled at 30 fathoms and the eye of a wire hawser was shackled to the end of the chain. The wire, which had been passed outside of everything from aft, was bighted down on the poop and stoppered clear for running. The *Cincinnati* then worked into position astern of the *Pershing,* let go her

sheet anchor, and sent the end of the wire to the starboard quarter of the *Pershing*. The sheet chain was buoyed with new five-inch line, with ample drift, for use in recovering the anchor.

That morning, October 3, another order was received, for the *Cincinnati* or *Albatross*, or both, to proceed immediately to the rescue of the tank steamer *Edward L. Doheny*, aground on Maryland Shoal, three and a half miles to the westward of American Shoal light.

The *Albatross* stood to the eastward immediately. The *Cincinnati* finished laying out her sheet anchor and then followed the *Albatross*.

Ensign Quinby was left, with the *Ivy*, to continue the work of laying out the kedges and heaving them down hard as the tide fell. Lighters had been sent for, as it was evident that the *Pershing* was hard and fast aground. The work of lightering the cargo was begun. The effect of this work will be referred to later.

Upon arriving at Maryland Shoal it was found that the *Doheny* had her bow high up on the reef, upon which she had struck at 3.00 a. m., almost carrying away the beacon.

The *Albatross* and *Peoria* were lying off preparing to tow in tandem. The *Albatross* had already attempted to tow the *Doheny* off, but had been set into dangerously shoal water.

The *Edward L. Doheny* is a modern steel tanker 415 feet long. She was in ballast, and went on the reef bows on, heading to the westward.

A conference was held on board the *Doheny*.

Ensign Johnston of the *Cincinnati*, with a signalman, was left on board the *Doheny* as wrecking master.

Until the United States entered the war Ensign Johnston's seafaring experience had been confined to tennis courts, where he rode the crest of the wave, and won the championship of the world.

But to return to the *Doheny*. When the ship struck the reef in the night, and began to pound, the captain, being unable to back off, wisely flooded tanks until she rested easily, and then waited for daylight and assistance.

The ship's stern, fortunately, was afloat, and her propeller clear.

With a kedge astern and ships towing, the *Doheny* pumped out ballast forward and flooded aft.

The *Albatross* and *Peoria* having parted a tandem tow line, the *Cincinnati* anchored close to the reef on the *Doheny's* port quarter, veered down and ran a wire hawser to her starboard quarter.

When all was in readiness the *Doheny* backed full speed, the *Cincinnati* hove in on her chain and steamed ahead, and the *Doheny* floated clear, at about 4.00 p. m., October 3.

The *Cincinnati* got the wire hawser on board and all ships returned toward Key West, in time to resume work on the *Pershing* without losing a tide.

It may be well to explain more clearly the situation on the *Pershing*. She is a large wooden five-masted schooner, with twin auxiliary engines. But one engine was out of commission.

The ship had recently run through a hurricane and had lost several of her spars. Wire rigging falling over the side had fouled her port propeller. She was loaded with lumber, long heavy timbers. The deck load was covered with oil, which made the task of lightering the cargo not only dirty work, but also slow and difficult. There was practically no water ballast or other easily shifted cargo, which might have lifted her bow or stern clear of the shoal. For five days and nights kedging and towing continued. Large working parties of seamen from the Naval Training Station and seamen and marines from the *Cincinnati*, assisted the small and inexperienced crew of the *Pershing* in discharging the heavy timbers and loading them on lighters.

It might have discouraged the working parties to know that the result of their arduous labors was to decrease the draft of the *Pershing* less than two inches a day. But they did not realize it.

It was necessary to continue the work of lightering cargo because the ship lay in the coral sand like a great log, and there was doubt as to the ability of the available vessels and gear to haul her off the shoal.

A twelve-inch hawser parted under heavy strain, and this for a time seemed the last resource.

But a large new wire hawser was found in store, and on the night of October 7, the *Cincinnati* and *Ivy* were anchored in position and ready for towing as the tide neared the flood.

The *Cincinnati* had shortened in on the twelve-inch hawser led to the *Pershing's* port quarter, let go both anchors and veered to a long scope of chain.

The *Ivy* towed off the *Pershing's* starboard quarter.

The *Cincinnati* hove in on both anchors until there was a strain on the chain, then steamed ahead slowly on one engine, then on both engines, gradually increasing the speed of the engines and heaving around on the anchor engine as the hawser straightened out.

At 9.15 p. m., October 7, shortly before the top of high water, the *Pershing* slid about half her length astern. This probably brought her bow upon the eastern shoal, leaving all the rest of the ship afloat. Another light pull brought her entirely afloat.

The *Ivy* slipped and got clear and anchored.

The *Cincinnati* held on and towed the *Pershing* well clear, when the *Pershing* cut the twelve-inch hawser and anchored. The men on deck cheered.

The word was passed to the engine room, and three more cheers came up through the fire room ventilators.

It had been all a part of the day's work, with an element of novelty to spice it.

The *Cincinnati* got the twelve-inch hawser on board and anchored for the night.

The next morning the *Ivy* and *Peoria* towed the *Pershing* into port, and the *Cincinnati* proceeded on other duty.

This was the work of youth and inexperience. Spirit and versatile intelligence carried it through.

Men who began with ten thumbs ended the week with a better proportion of fingers.

A number of the petty officers taking active direction of the work, boatswain's mates and coxswains, were less than twenty years of age, with less than a year of sea service to their credit.

The executive officer of the ship was absent.

Lieutenant F. B. Stump, U. S. N., navigator and acting executive officer, the man who had full charge of the details of the work, is not yet twenty-four years old. He was graduated from the Naval Academy eighteen months ago. His direction of the work was in no sense nominal or perfunctory.

It was necessary for the captain to remain on the bridge during the many hours of towing.

The youthful executive officer, with young and inexperienced officers and petty officers, was in full charge aft.

He had to make many trips between the ships and arrange for working parties, food, relief, and make all preparations for tow-

ing, running lines, repairing damages, and carrying on the ship's routine.

So much for young America.

The chief boatswain's mate was a tower of strength, as all chief boatswain's mates should be at such a time; but as youth goes in these days he is a veteran. He must be thirty years old, though he doesn't look it.

From these experiences, and from earlier work of this kind which has fallen to my lot, the following suggestions are offered to any who may need them.

(a) When going to the rescue of a stranded vessel, rig ship for towing and get up gear that will probably be needed.

(b) This gear includes heaving lines, light lines for running hawsers, heavy hawsers, fenders and shackles, shackling tools, small jiggers and heavy deck tackles.

(c) See that a good life boat's crew is ready.

(d) Provide a lead line marked in feet, and detail an officer or competent man to sound and make a sketch and record of soundings around the stranded vessel, and of the water in which the towing ships must work.

(e) Look up the state of the tide, the rise and fall, times of high and low water, prevailing set and drift, and the variation in the tide. This variation in the tidal rise may sometimes be of great importance.

(f) See that sheet anchor and chain, and kedges are free, and bitter ends of cables ready for slipping.

(g) Close water-tight compartments wherever practicable.

(h) Pick an officer for wrecking master, and a signalman to accompany him.

(i) Arrange simple signals. Give one copy of signals to wrecking master and post one copy on bridge. These signals should include, for night and day; 1. "moving," 2. "stop," 3. "haul," 4. "all clear," 5. "not clear," 6. "cut," 7. "let go."

Semaphore, by day, or blinker, at night may be used for all of these signals except 1. "Moving," and 2. "Stop." Whistle signals, day or night, or flags by day and lights at night, should be arranged for reporting any movement of the stranded ship and for stopping the tow instantly.

(j) Put over, mark and tend a heavy drift lead on the stranded ship, and on each ship in position for towing. At night a quick

leadsman may inform the bridge that the ship has started ahead before report can come from aft that the line has parted.

If the towing ship has out a long scope of chain and stops her engines promptly after a tow line parts, or the stranded ship suddenly floats, then she will not gather headway enough to hurt anything.

But she should not have out enough chain to extend back to her own propellers when the chain tends aft. A broken line may prevent the use of the engines.

(k) All should be in readiness to heave in the chain, or else to veer it and slip if necessary, to avoid a collision.

(l) As a rule the stranded vessel will have her anchors down, to lighten the bow, and perhaps for kedging. And there is little danger of the vessel colliding with the towing ship.

In the case of the *Doheny*, however, she had out only a small kedge astern. She picked up this kedge too quickly, fearing it would foul her propeller.

As a matter of fact, picking up this kedge too soon almost caused serious trouble. It allowed the *Doheny's* stern to drift across the wire towing hawser; but the *Cincinnati's* whale boat got under the *Doheny's* counter and cleared the wire before it fouled the screw. In doing the job over again I would make the *Doheny* let go a bower anchor to check her sternboard when afloat.

Perhaps the most interesting minor detail in connection with the salvaging of the *Pershing* was as follows:

The *Cincinnati* shackled a wire hawser to her towing bridle and sent a hauling line from the end across to the *Pershing*.

In hauling the wire across it caught on a coral head on the bottom, and stuck. Steam winches and men could not move it, and the experiment was tried of underrunning the wire hawser by forcing the bow of a motor sailing launch along under the wire.

The coxswain of the motor sailer, a boy of nineteen, was ordered to stop the engine in order that he might clearly hear his instructions. With the engine stopped the boat was moved under the wire, and the crew began to haul it ahead. The bow of the boat wedged itself under the wire, and as the bow man walked the hawser aft the boat moved easily ahead, lifting the wire hawser from the bottom as it forged ahead.

Some component of the tidal current must have set the boat along the wire. Without starting the engine, with only the

pressure of a bight of the hawser behind it, the boat ferried itself quickly across from the *Cincinnati* to the *Pershing* in about two minutes, and the line was clear.

Captain L. H. Chandler, in the May number of the NAVAL INSTITUTE PROCEEDINGS, explains a towing trick learned from Chapman & Merrit, wreckers; the use of a spring on the tow-line to hold the towing vessel up against the set of wind or tide.

Within the past week I have seen a towing vessel forced to slip and run in order to save herself, when a spring from her bow to the tow-line would have held her safely in position.

Captain Chandler also quotes an experienced wrecker's axiom to the effect that beyond a certain point it is of little use to add to the strain on towing hawsers and kedges.

By very gradual increase in the strain on the towing gear a close approximation can be made to the maximum strain that it is advisable to put on the hawser. It may be advisable to break the weakest link in the gear in order to be sure. After knowing about what towing strain may be safely taken, it may be advisable to try towing at various angles with the keel of the stranded ship. The facilities for flooding, pumping, and shifting cargo should be carefully considered. They may solve the problem.

If a good diver is available it may be well to send him down to examine and report the underwater conditions.

The amateur wrecker undertaking salvage operations on an extended scale should prepare himself for many failures and disappointments; it is a job for Job, requiring infinite patience under adversity. On the other hand, it is a task where patience yields an almost sure reward.

In wrecking, the importance of the tidal rise and fall may vary greatly.

In the salvage of a ship like the *Doheny,* with stern in deep water and ability to alter trim several feet quickly by shifting ballast, a small tidal rise may sometimes be neglected.

In salvaging the *General Pershing* the tide was the controlling factor. The best speed of discharging the cargo lightened the ship only about two inches a day.

The range of the tide was approximately twenty inches, which was equivalent to a lift of a thousand tons.

It is well to remember that,

> "There is a tide in the affairs of men,
> Which, taken at the flood, leads on to fortune."

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RESILVERING SEXTANT MIRRORS

By LIEUT. COMMANDER ROBERT T. YOUNG, U. S. Navy

At present when ships are making long sea voyages, frequently the navigator will find that his sextant mirrors are going bad and no spares available. He is also apt to find his sextant mirrors in such condition that although the sun can be handled, great difficulty is encountered with stars. If such is found, the mirrors can be very successfully resilvered with the facilities on board ship.

Frequently I have asked navigators and officers who have finished their navigator's cruise, if they ever resilvered their mirrors; invariably the answer was that they had tried it, but could not make it work.

The following system was used on a surveying expedition to the Sandwich Islands of which the writer was a member, and was found to be very successful; in fact, the system we used entirely to keep the boating parties supplied with mirrors.

PREPARATORY

(a) Get some tin-foil—that from the average package of cigarettes is entirely satisfactory.

(b) Obtain a small bottle of ether-alcohol from the doctor—this is used to thoroughly clean the glass.

(c) Get a few drops of mercury—should no other be available, a few drops from the artificial horizon will not be missed.

(d) Obtain some clear shellac—the gummy sediment which collects in the base of receptacle is better. If possible and near a navy yard, send the chief quartermaster over to the yard and borrow a small bottle of the substance used at the yard for that purpose.

OPERATION

(a) Carefully unroll the wrapping of the cigarettes so as not to crumble the tin-foil. Cut out a piece about twice the size of that which will be required for the actual backing. Place this on a pad of paper, examine and see which side will be the better

for the backing. Your eye will quickly note which will be the better. Decide; place it on a pad and flatten by placing a piece of paper on top, and apply light pressure.

(b) Thoroughly clean the glass with ether-alcohol and absorbent cotton.

(c) Place a few drops of mercury on a clean blotter and thus remove any dirt.

(d) Place a drop of mercury on the part of the tin-foil which will not be used for actual backing. It will form like a blister. Raise the pad and enlarge blister by an inclined circular motion. Add more drops of mercury as necessary until the blister has extended over the entire tin-foil. Put the pad down on the desk. Take the sextant glass and gently slide over the mercury. Examine and see if clear of flaws. Then remove glass by sliding off and reclean. Some sediment will probably be found on the surface of the mercury. Again gently slide the glass over the mercury to the correct position, and if clear of flaws, turn up the outboard edges, place the pad in an inclined position to allow the excessive mercury to drain off and let backing set. At least twenty-four hours should be allowed.

(e) Collect the excessive mercury and put in bottle. It is essential that the part of the tin-foil where the mercury was first dropped on should not be used as the actual backing. For some reason this spot will crumble up and spoil the backing.

(f) When tin-foil has set, remove the edge and apply backing. In applying do not use a brush or anything that rubs. It will tear the tin-foil. Apply as you did the mercury to the tin-foil. Put on one drop and work it over the tin-foil by an inclined circular motion, until entirely covered. Be careful to just cover the observing edge, but thoroughly cover all the other edges. Then let backing set and dry.

It is well to practice first with a piece of glass about the size of an index glass, but watch the sharp edges. They are apt to tear the tin-foil. After a little practice you will be able to make perfectly satisfactory mirrors—so will your chief quartermaster.

Although the above will be found to be perfectly satisfactory, it is essential that the navigator should not allow his sextant to be unduly exposed, or his mirrors to get in unsatisfactory condition, but if they should and time be available, the above will be found to produce excellent results.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Prize Essay Contest, 1919

The Board of Control announces the following awards in the Prize Essay Contest, 1919:

First Honorable Mention to Captain Reginald R. Belknap, U. S. Navy. Subject, "Military Character."

Second Honorable Mention to Lieut. Commander Beirne Saunders Bullard, C. C., U. S. Navy. Subject, "Some Reflections on the Three Factors of Battleship Design."

No Prize Essay has been awarded for the year 1919.

Book Announcements

Elementary Steam Engineering by C. M. Reed has been published by the Institute and is ready for sale; for table of contents see book list. The Institute will publish the "North Sea Barrage," a short photographic history of the U. S. Mine Planters' operations in the North Sea. The book will be ready about April 15, 1919, and sell for $3.00 per copy. The edition will be limited and the Institute will be glad to receive orders in advance.

Dues

The annual dues ($2.50) for the year 1919 are now payable.

Membership

Life, regular and associate membership, 5728.
Resignations: 10.
Deaths:

Rear Admiral S. W. Very, U. S. N., Ret.
Lieutenant Commander Merritt Hodson, U. S. N.
Lieutenant C. E. Lewis, U. S. N.
Lieutenant W. H. A. Pike, U. S. N.
Mr. M. R. Tipton.

Address of Members

All members are urged to keep the Secretary and Treasurer informed of the address to which PROCEEDINGS *are to be sent, and thus insure their receipt. This precaution is now of particular importance as notices of changes of stations are not now available for use of the Institute's staff.*

Members and subscribers are urged to notify the Secretary and Treasurer promptly of the non-receipt of PROCEEDINGS, in order that tracers may be started. The issue is completed by the 10th of each month.

Book Department

The Institute Book Department will supply any obtainable book, of any kind, at retail price, postage prepaid. The trouble saved the purchaser through having one source of supply for all books, should be considered. The cost will not be greater and sometimes less than when obtained from dealers.

Reprints of Articles

The attention of authors of articles is called to the fact that the cost to them of reprints other than the usual number furnished, can be greatly reduced if the reprints are struck off while the article is in press. They are requested to notify the Secretary and Treasurer of the number of reprints desired when the article is submitted. Twenty copies of reprints are furnished authors free of charge.

Illustrations

Authors of articles submitted are urged to furnish with their manuscript any illustrations they may have in their possession for such articles. The Institute will gladly co-operate in obtaining such illustrations as may be suggested by authors.

Original photographs of objects and events which may be of interest to our readers are also desired, and members who have opportunities to obtain such photographs are requested to secure them for the Institute.

Notice Whole Nos. 145, 146, 147, 149, 155, 166 and 179 of the PROCEEDINGS (March, 1913, June, 1913, September, 1913, January-February, 1914, January-February, 1915, and November-December, 1916, January, 1918) are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 25 cents per copy.

ANNAPOLIS, MD., January 15, 1919.

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Notice: the Executive Council, 1919; June, 1923; September, 1924; January-February, 1925; January-February, 1926; January-February, 1928; and November-December, 1929; January, 1930) are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 25 cents per copy.

New York, Dec. January 15, 1930.

INFORMATION INDEX

UNITED STATES NAVAL INSTITUTE
ANNAPOLIS, MD.

REPORT OF AUDIT FOR THE YEAR ENDED DECEMBER 31, 1918

BALTIMORE, MARYLAND, January 14, 1919.

TO THE OFFICERS AND MEMBERS OF THE UNITED STATES NAVAL INSTITUTE,
ANNAPOLIS, MARYLAND.

Gentlemen.—We have audited the books of the *United States Naval Institute, Annapolis, Maryland,* for the year ended December 31, 1918, and submit herewith a certificate, one page of comments and the following exhibits and schedules:

Exhibit A.—Balance sheet as of December 31, 1918.

Schedule No. 1.—Statement of cash receipts and disbursements for the year ended December 31, 1918.
Schedule No. 2.—Investments.
Schedule No. 3.—Accounts receivable.
Schedule No. 4.—Accounts payable.
Schedule No. 5.—Advanced payments all as of December 31, 1918.
Schedule No. 6.—Statement of income and expense for the year ended December 31, 1918.

Respectfully,
BLACK AND COMPANY,
Certified Public Accountants,
By WILMER BLACK, C. P. A.
(*Member American Institute of Accountants.*)

UNITED STATES NAVAL INSTITUTE
ANNAPOLIS, MARYLAND

CERTIFICATE

We have audited the books of the *United States Naval Institute, Annapolis, Maryland,* for the year ended *December 31, 1918,* and

We hereby certify that the accompanying *balance sheet* and *statement* of *income* and *expenses* are correct and in our opinion, subject to the attached comments, clearly set forth the true financial condition as of *December 31, 1918,* and result of operations for the year ended *December 31, 1918,* respectively, as disclosed by the books of account.

BLACK AND COMPANY,
Certified Public Accountants,
By WILMER BLACK, C. P. A.
(*Member American Institute of Accountants.*)

Baltimore, Maryland, January 14, 1919.

UNITED STATES NAVAL INSTITUTE
ANNAPOLIS, MARYLAND

COMMENTS ON THE AUDIT OF THE BOOKS FOR THE YEAR ENDED DECEMBER, 31, 1918

Exhibit A, Schedule No. 6, shows the Cost of Publications sold. The overhead this year is $11,852.64 and 5.45 per cent should be added to the cost to include these items.

Notwithstanding a marked reduction in the value of the inventory and a charging off such an amount as will bring the value of investments (bonds) on the book at the market value the Net Profits for the year is $53,121.35.

There has also been charged into this year's expenses, cost of books, etc., sold during the year ended December 31, 1917, to the amount of $2,359.81, which makes the Net Profit for this year just that much less.

Heretofore all receipts from Dues, Advertisements and Subscriptions have been taken up as an earning for the year in which they were received. This year, however, there has been taken up as an earning only those items that have actually been earned during the year and all items paid in advance have been carried as a payment in advance, for details see Exhibit A, Schedule No. 5.

Our examination has been very carefully made and no discrepancies or inaccuracies were disclosed. The records, books, accounts, etc., were found to be in good condition and worthy of commendation.

EXHIBIT A

BALANCE SHEET, DECEMBER 31, 1918

ASSETS

Current Assets.		
Cash (in bank), Schedule No. 1	$44,017.33	
Investments, Schedule No. 2	65,805.00	
Accounts receivable, Schedule No. 3	74,257.02	
Inventory	15,159.96	
Prepaid royalties	1,193.83	
Total Current Assets		$200,433.14
Balance	$157,078.55	
Furniture and fixtures	100.00	
		$157,178.55

LIABILITIES

Current Liabilities.		
Accounts payable, Schedule No. 4	$41,475.57	
Advanced payments, Schedule No. 5	1,879.02	
Total current liabilities		$43,354.59
Balance (excess of current assets over current liabilities)		157,078.55
		$200,433.14
Reserve fund.		
Balance, January 1, 1918	$7,894.09	
Cash receipts	240.00	
		$8,134.09
Surplus.		
Balance, January 1, 1918	$95,923.11	
Add: Net profit for the year ended December 31, 1918 (for details see Exhibit A, Schedule No. 6)	53,121.35	
		149,044.46
		$157,178.55

EXHIBIT A.—SCHEDULE No. 1

STATEMENT OF CASH RECEIPTS AND DISBURSEMENTS FOR THE YEAR ENDED DECEMBER 31, 1918

Balance, January 1, 1918		$13,815.57
RECEIPTS		
Overpayments	$73.63	
Dues	10,743.88	
Subscriptions	3,365.37	
Sale of books purchased	4,310.66	
Advertisements	1,603.85	
Interest on investments—bank balances	4,080.86	
Postage	65.05	
Binding	100.60	
Life membership fee	240.00	
Sale of extra publications	216,078.70	
Sale of Proceedings	885.73	
Credits	111.46	
Sundries	156.52	
Certified checks	11,241.00	
Total receipts		253,057.31
		$266,872.88
Balance, January 1, 1919		**$44,017.33**
DISBURSEMENTS		
Printing and binding Proceedings	$20,441.45	
Printing and binding extra publications	144,219.99	
Salaries	8,430.44	
Contributors	3,318.75	
Authors of books (royalties)	21,766.25	
Postage and telegrams	3,371.92	
Expressage, freight and hauling	2,499.57	
Board meetings	637.68	
Purchase of books for sale	3,164.06	
Office expense—stationery, supplies, etc	2,167.00	
Advertising	451.20	
Prize essay award	200.00	
Certified checks	1,200.00	
First honorable mention award	200.00	
Second honorable mention award	125.00	
Engraving prize essay bar and case	4.50	
Overpayments	122.13	
Purchase Liberty Loan bonds	10,000.00	
Sundries	27.90	
Office furniture	288.61	
Insurance	181.60	
Dues—refunded	37.50	
		$222,855.55
Balance, December 31, 1918		**44,017.33**
		$266,872.88

Balance, December 31, 1918			**$44,017.33**
Seaman's Bank for Savings, New York City. Balance as per letter dated January 16, 1919.			$3,000.00
Rhode Island Hospital Trust Co., Providence, R. I. Balance as per letter dated January 16, 1919.			3,865.10
Annapolis Banking and Trust Company, Annapolis, Maryland. Balance as per letter dated January 15, 1919.			8,106.66
Society for Savings, Hartford, Conn. Balance as per letter dated January 16, 1919.			3,921.66
Farmers' National Bank, Annapolis, Maryland. Balance as per statement dated January 3, 1919		$27,995.00	
Less Outstanding Checks.			
#2747	$ 2.50		
3171	1.80		
3439	2.04		
3498	1.50		
3752	8.00		
3926	5.00		
4086	10.00		
4544	5.00		
4590	32.00		
4661	30.00		
4786	5.00		
4801	10.00		
4804	11.68		
4816	19.25		
4817	13.28		
4822	63.09		
4823	23.40		
4824	65.44		
4826	401.94		
4827	30.83		
4829	7.53		
4830	273.02		
4832	457.43		
4833	14.61		
4834	603.09		
4835	21.48		
4836	4.93		
4841	3.26		
4842	32.68		
4844	266.62		
4855	65.44		
4848	30.00		
4850	35.00		
4851	20.00		
4856	25.00		
4858	4.00		
4860	18.00		
4861	52.00		
4862	32.00		
4863	26.00		
4864	63.00		
4865	39.00		
4866	19.50		
4867	10.00		
4868	5.00		
4869	10.00		
4870	1.00		
		2,881.34	
		$25,113.66	$18,893.42

Balance, December 31, 1918		**$44,017.33**
Brought forward	$25,113.66	$18,893.42
Add: Error in check #4646 check drawn for $16.58 Stub 15.58	1.00	
	$25,114.66	
Add: Foreign drafts out for collection	9.25	
		25,123.91
		$44,017.33

EXHIBIT A.—SCHEDULE No. 2

SECURITIES (BONDS) DECEMBER 31, 1918

	Par Value	Book Value
Southern Railway (96).		
6 $1000 5% registered gold bonds, #M257-247-475 476-477-478, due July 1, 1994	$6,000.00	$5,760.00
Washington Railway and Electric Company (72).		
2 $1000 4% 50-year gold consolidated mortgage bonds, #2183-2184, due July 1, 1951	2,000.00	1,440.00
Northern Pacific and Great Northern R. R. (95½).		
8 $1000 joint bonds registered 4%, due July 1, 1921, # M13253-4-5-11769-70-1-11171-2. 2 $5000 C. B. and Q. collateral registered 4%, due July 1, 1921, #5199-5401	18,000.00	17,190.00
Northern Pacific Ry. (60½).		
4 $1000 3% registered gold bonds, #M1610-1-2-1650. 1 $5000 3% registered gold bond, #1123. 3 $1000 3% registered gold bonds, # M21543-4-5, general lien due January 1, 2047	12,000.00	7,260.00
B. and O. R. R. Company.		
1 $5000 1st mtge. 4% 50-year gold registered, due February 17, 1960, #A436 (80½)	5,000.00	4,025.00
1 $1000 1st mtge. 4% 50-year gold registered, due February 17, 1960, #M1230 (80½)	1,000.00	805.00
3 $1000 prior lien 3½%, due 1925, #S. M. 383-4-5 (89)	3,000.00	2,670.00
($8,134.09 of these bonds belongs to the Reserve Fund.)		
Potomac Electric Power Company (95).		
2 $1000 5%, #833-4, due June 1, 1929	2,000.00	1,900.00
New York City Registered 4¼% (96½).		
1 $7000, #588, due March 1, 1962, corporate stock	7,000.00	6,755.00
3½% Liberty Loan Bonds Registered.		
5 $1000, #6033-4-5-6-7, due June 15, 1947	5,000.00	5,000.00
4% Liberty Loan Bonds 2d 1917.		
3 $1000, #16830-1-2, due November 15, 1927	3,000.00	3,000.00
4¼% Liberty Loan Bonds.		
5 $1000, #26484-5-6-7-8, due September 15, 1928	5,000.00	5,000.00
4¼% Liberty Loan Bonds, receipts	5,000.00	5,000.00
	$74,000.00	$65,805.00

EXHIBIT A.—SCHEDULE No. 3

ACCOUNTS RECEIVABLE, DECEMBER 31, 1918

Back dues	$2,400.61
Subscriptions	52.59
Advertisements	352.62
Extra publications	71,451.20
	$74,257.02

EXHIBIT A.—SCHEDULE No. 4

ACCOUNTS PAYABLE, DECEMBER 31, 1918

Lord Baltimore Press	$34,886.00
C. and P. Telephone Company	2.05
R. Beresford	375.90
L. K. Murrill Company	495.85
D. Van Nostrand Company	34.15
Lippincott Co.	29.49
Lucas Brothers	56.88
Baker and Taylor	1.80
Meyer and Thalheimer	20.73
Wiley and Sons	9.38
Little, Brown and Company	3.35
Longmans, Green and Company	7.31
Century Company	2.52
Doubleday, Page and Company	2.76
Lea and Febiger	1.70
Funk and Wagnalls Company	4.13
E. P. Dutton and Company	3.02
Macmillan Company	2.50
McGraw Hill Book Company	3.40
A. and C. Black	1.38
Stevens and Brown	3.88
Inter Film Service	2.00
Blackiston Sons and Company	3.70
American R. R. Express Company	952.15
Roycrofters	1.60
Scribner's Sons Company	30.66
E. N. Appleton	3,710.85
James Gantt	5.76
Postmaster, Annapolis, Maryland	41.90
Naval Academy Officers' Mess	1.40
Western Union Telegraph Company	3.09
H. K. Fly Company	1.81
Putnam's Sons	3.60
E. Wilkinson	150.45
Sundry authors, royalties	588.42
Overpayments	30.00
	$41,475.57

EXHIBIT A.—SCHEDULE No. 5

ADVANCED PAYMENTS, DECEMBER 31, 1918

Advertisements	$13.50
Dues	1,227.19
Subscriptions	638.33
	$1,879.02

EXHIBIT A.—SCHEDULE No. 6

STATEMENT OF INCOME AND EXPENSES FOR THE YEAR ENDED DECEMBER 31, 1918

Inventory, January 1, 1918.			
Extra publications	$9,314.26		
Extra numbers of Proceedings	300.00		
		$9,614.26	
Add: Purchases for year.			
Books for sale	$3,308.96		
Printing and binding Proceedings	21,399.23		
Printing & binding extra publication	172,467.02		
		197,175.21	
		$206,789.47	
Deduct: Inventory, December 31, 1918.			
Extra publications	$15,159.96		
Extra numbers of Proceedings		15,159.96	
			$191,629.51
Expressage, freight and hauling	$2,994.33		
Contributors	3,318.75		
Authors of books (royalties)	15,584.87		
Prize essay award	200.00		
First honorable mention award	200.00		
Second honorable mention award	125.00		
Postage and telegrams	3,350.00		
Engraving prize essay bar and case	4.50		
			25,777.45
Cost of publications sold			$217,406.96
Profit on sale of publications, etc.			59,323.91
			$276,730.87
EXPENSES			
Salaries		$8,430.44	
Office expenses		2,081.27	
Board meetings		637.68	
Insurance		101.60	
Lawyer's fee		150.45	
Advertising		451.20	
Total expenses		$11,852.64	
5.45% on cost.			
4.77% on sales.			
Bonds charged off	$8,195.00		
Furniture charged off	1,139.36		
		9,334.36	
Total deductions		$21,187.00	
			21,187.00
Excess of income over deductions transferred to surplus			53,121.35
			$74,308.35
Sale of extra publications			$267,092.90
Sale of books			4,310.66
Sale of Proceedings			885.73
Total sale of publications			$272,289.29
Subscriptions			2,776.63
Advertising			1,564.35
Binding			100.60
Total sale of publications, etc.			$276,730.87

INCOME

Profit on sale of publications, etc.	$59,323.91
Dues	10,626.80
Interest on investments	4,080.86
Miscellaneous	276.78
	$74,308.35

This report of audit was accepted and approved by the Board of Control, for publication, January 31, 1919.

G. M. RAVENSCROFT,
Secretary and Treasurer,
U. S. Naval Institute.

THE 7" NAVAL TRACTOR MOUNT FIRING AT 30° ELEVATION. SEE PROFESSIONAL NOTES UNDER ORDNANCE AND GUNNERY.

PROFESSIONAL NOTES

PREPARED BY

COMMANDER S. A. TAFFINDER, U. S. Navy

GENERAL ARRANGEMENT

VESSELS BUILDING.
CHARACTERISTICS OF NAVAL VESSELS.
NAVAL POLICY.
MATÉRIEL.
PERSONNEL.
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FRANCE.

A NEW FRENCH CRUISER.—Reports from Paris indicate that the *Lamotte-Piquet*, the nameship of a new class of light cruisers, is either completed or approaching completion. It is nearly 20 years since France launched a vessel of this type, preference having been given to large and expensive armored cruisers, which have proved very wasteful to run, and much too slow to be of value as scouts. The *Lamotte-Piquet* is a distinctive design, and appears to possess several points of advantage over her foreign contemporaries. She is 453 ft. in length, 45¼ ft. in beam, draws 16½ ft., and displaces either 4100 or 4500 tons. She is fitted with Parsons turbines, driving four shafts, and has twelve Du Temple-Guyot boilers, of which eight are oil-fired. The turbines are expected to develop 42,000 horsepower, giving a speed of 32 knots. The armament comprises eight 5-inch Q. F. guns of a new model, 55 calibers in length, using an 81-lb. projectile, and so disposed as to give a broadside of six and an end-on fire of four guns, all of which have excellent arcs of fire. Unusually good protection to the gun crews is afforded by 6-inch shields, while four of the weapons are mounted in broadside casemates of the same thickness. The hull for two-thirds of its length is protected by a 2-inch belt, associated with a ¾-inch deck. The *Lamotte-Piquet* was built at Toulon, and her two sisters at private yards. They are officially styled "conveyeurs d'escadrilles."—*The Engineer* 13/12.

FRENCH FLEET BOUND FOR GERMAN PORTS.—Announcement was made at the Ministry of Marine to-day that a French naval division, composed of five units, of which the armored cruiser *Montcalm* is the flagship, is on its way to the Baltic Sea, having received orders to survey the carrying out by the Germans of the clauses of the armistice.

The vessels also will visit German ports where French prisoners are assembled in order to insure their repatriation under the best possible conditions.—*N. Y. Times*, 23/12.

FRANCE TO DOUBLE ITS MERCHANT FLEET.—According to the Paris *Matin*, Fernand Bouisson, Under Secretary of State for the Merchant Marine, has announced that within five years France will have merchant ships with a total capacity of 6,000,000 tons, which is double its pre-war tonnage. It is said that the greater part of the fleet will be composed of new vessels.—*Nautical Gazette*, 11/30.

FRENCH CASUALTIES AND COSTS.—The French High Commission authorizes publication of the following:

FRENCH LOSSES DURING THE WAR

Up to November 1, 1918:	
Dead (killed in action and dead of wounds)	1,028,800
Missing (given up for lost)	299,000
Total (Colonial troops not included)	1,327,000
Colonial troops:	
Dead	42,500
Missing	15,000
Grand total of dead and missing	1,385,300
Wounded (about)	3,000,000
[Of which 700,000 crippled and pensioned. To this figure must be added a great number of the 435,000 Frenchmen war prisoners henceforth unfit to work.]	
Grand total of French casualties	4,385,300

COST OF WAR TO FRANCE

Expenses—$23,500,000,000 (up to December 31, 1918)
Damages—$13,000,000,000 (approximate figure).
Pensions—$8,000,000,000 (approximate figure).—*U. S. Bulletin*, 14/1.

GERMANY

CAPTAIN PERSIUS ON GERMAN SUBMARINES.—The naval critic, Captain Persius, recently stated in the Berlin press that in 1917 only 83 submarines were constructed, while 66 were destroyed. He tells us that in April, 1917, Germany had 126 submarines and in October, 146. In February, 1918, she had 136 and in June of this year, 113. He verifies the statement of Admiral Sims that very few submarines operated at one time. In January, 1917, only 12 per cent were active, while 30 per cent were in harbor, 38 per cent under repairs and 20 per cent incapacitated. Submarine crews were insufficiently trained and distrusted the submarine, while experienced seamen looked upon the submarine warfare as a "political stupidity."—*Scientific American*, 21/12.

FINDS 170 U-BOATS BEING BUILT.—One hundred and seventy submarines, all under construction, were found when the Interallied Naval Commission visited Germany to make arrangements for the carrying out of the terms of the armistice, according to newspapers here. These U-boats, it is said, will be turned over to the Allies.—*Wash. Evening Star*, 4/1.

ALLIES WILL DESTROY PARTLY BUILT U-BOATS.—*New Armistice Terms Penalize German Trick—Our Commissioners go to Treves.*—The four

American armistice representatives left Paris to-day for Treves, where Marshal Foch is presenting the new terms to the German commission. The party consisted of Admiral William Shepherd Benson, Chief of Operations of the United States Navy; Norman H. Davis, representing the United States Treasury; Edward N. Hurley, Chairman of the American Shipping Board, and Louis P Sheldon, who will represent Herbert C. Hoover, the American Food Administrator.

A report presented to the council having charge of the carrying out of the naval items of the armistice stated, according to the morning newspapers, that the Interallied Commission which visited Kiel and Wilhelmshaven discovered submarines under construction in slips, which the enemy thought would be overlooked. The report adds that the Germans contended that they were entitled to regain possession of the underwater craft.

According to the report, the discoveries at Kiel and Wilhelmshaven led to the finding of other vessels, and consequently the new terms of the armistice will require the surrender of all submarines already built and the destruction of those on the ways.

It is also understood that the terms for the extension of the armistice provide for the turning over of the German commerical fleet to transport troops, in exchange for food, for the restitution of material taken from France and Belgium and for full compliance with the terms of the original armistice.

The economic terms approved by yesterday's session of the Supreme War Council require that Germany shall hand over to the Allies all her cargo steamers in German and other ports to enable the Allies to revictual Germany and such adjacent countries as may be decided upon. The terms also require the restitution of all manufacturing machinery, etc., taken from the invaded regions, which it is possible to identify. This was decided upon in the view that it would bring about a quicker revival of economic life than the payment of an equivalent in money.—*N. Y. Times*, 15/1.

A REMARKABLE ZEPPELIN FLIGHT.—From Germany now comes a startling story of the trip of a Zeppelin in November, 1917, which is of considerable interest despite the fact that it is over a year old. It appears that a Zeppelin started from Bulgaria for East Africa with 22 tons of munitions and medicines and a crew of 22. It had arrived over Khartoum, in the Sudan, when it was ordered by wireless to return because it was learned that the bulk of the forces of General von Lettow Vorbeck, the German commander in East Africa, had surrendered. It returned to its starting point four days after it had left. The Germans claim that this airship could have made a round trip between Berlin and New York, without stopping. It is also learned that the Zeppelin factory at Friedrichshafen is building an airship for transatlantic traffic, capable of carrying 100 passengers. It has nine engines and eight propellers. If the international situation clears up by next summer, the first flight will probably be made in July. The flight is expected to be made in 40 hours.—*Scientific American*, 28/12.

TO GET BATTLESHIP "BADEN."—*Allies Will Receive New German Craft at British Port.*—Germany's newest battleship, the *Baden*, will be surrendered at a British port within a few days, in accordance with the terms of the armistice, according to announcement here.

The *Baden* has a displacement of 28,000 tons. Owing to the fact that this ship was completed after the war began, little is known as to its armament. It has been reported that ships of this class had been armed with 16.5- or 17-inch guns, but information on this point has been meager and unreliable.—*N. Y. Times*, 4/1.

WHY THEY GAVE UP THE "-U-9."—*German Crew Cared More for $125 Bonus Than for "Glorious Record."*—Although Admiral Beatty, Commander of the British Grand Fleet, refrained from requiring the delivery

of the German submarine *U-9*, with which Commander Weddigen torpedoed and sank three British cruisers, out of consideration for the "glorious record" of his boat, says the *Cologne Volkszeitung*, the submarine was delivered to the British because the German crew was unwilling to forego the opportunity of earning the 500 marks promised to each for taking the boat to England.—*N. Y. Times*, 23/12.

INSIST ON PAYMENT FOR U-BOAT RAVAGES.—In the absence of a definite policy from the Allies concerning the manner in which Germany shall make compensation for the dependents of submarine victims among seamen, the Executive Committee of the International Federation of Seafarers has evolved a plan by which the officials hope to force the Peace Conference to act. The committee has called an internationl conference in London, on February 24, at which the British delegates will present a resolution providing that the seamen will not man any ships going or coming from an enemy country until the proper compensation is agreed upon.—*N. Y. Times*, 16/1.

CASUALTIES IN THE WAR.—An exchange telegraph dispatch from Copenhagen states that Austria-Hungary suffered a total of over 4,000,000 casualties in killed and wounded, the total number killed being 800,000 men and 17,000 officers. The Socialist *Vorwarts* of Berlin places the total German losses at 6,330,000, of which about 1,600,000 were killed and the fate of 260,000 is unknown. The total number of prisoners is put down as 490,000.—*Scientific American*, 21/12.

GREAT BRITAIN

BRITISH WARSHIPS COMMISSIONED SINCE 1914.—The following table shows all battleships commissioned subsequent to August 1, 1914:

Name	Displacement	Builder	Laid down	Completed
	Tons			
Benbow	25,000	Beardmore	May, 1912	Aug., 1914
Emperor of India	25,000	Vickers	May, 1912	Sept., 1914
Erin	23,000	Vickers	Feb., 1911	Aug., 1914
Agincourt	27,500	Elswick	Sept., 1911	Aug., 1914
Canada	28,000	Elswick	Dec., 1912	1915
Queen Elizabeth	27,500	Portsmouth	Oct., 1912	Nov., 1914
Warspite	27,500	Devonport	Oct., 1912	1915
Valiant	27,500	Clydebank	Feb., 1913	1915
Barham	27,500	Fairfield	Jan., 1913	1915
Malaya	27,500	Elswick	Oct., 1913	1915
Royal Sovereign	25,750	Portsmouth	Jan., 1914	1915
Royal Oak	25,750	Devonport	Jan., 1914	1915–16
Resolution	25,750	Palmer	Nov., 1913	1915–16
Ramillies	25,750	Beardmore	Nov., 1913	1915–16
Revenge	25,750	Vickers	Dec., 1913	1915–16

Of the above ships, *Benbow* and *Emperor of India* belong to the *Iron Duke* class. The *Agincourt* had originaally been laid down at Elswick for Brazil, but before completion was sold to Turkey for £2,725,000. In July, 1914, she was completing her trials at Devonport, where she was taken over for the British Navy, and named the *Agincourt*. The peculiarity of this ship is her powerful armament, consisting of fourteen 12-inch guns, all of which are disposed in double turrets on the center line of the ship; and twenty 6-inch Q. F., in addition to many smaller guns. The *Erin* was

originally laid down for Turkey as the *Rechadieh,* but was appropriated by the British Admiralty early in August, 1914. In general design and armament she closely resembles the *Iron Duke* class. The *Canada* was laid down for the Chilean Government, purchased in 1914 for the British Navy, and commissioned in the following year. Her main battery of ten 14-inch guns introduced a new caliber into the British service, though since then certain vessels of the *Monitor* class have been armed with the guns of this size.

The main features of the *Queen Elizabeth* class are too well known to need repetition, but it may be said that the vessels have been uniformly successful in service, and, by common consent, are among the very finest battleships now afloat. The five *Royal Sovereigns* are slightly smaller and considerably slower editions of this class, but in all other respects, including armament and protection, they are identical with the *Queen Elizabeth.* Their main dimensions are: Length, 624¼ ft.; beam, 88½ ft.; draught, 27 ft.; displacement, 25,750 tons. They have Parsons turbines and Babcock or Yarrow boilers, which, at first designed for coal, were afterwards altered for liquid fuel.

Information relative to battle cruisers added to the fleet since the beginning of the war is less definite. Only one vessel of this type, viz., the *Tiger,* was in hand in August, 1914, and she was commissioned two or three months later. When laid down at Clydebank in June, 1912, she was intended to be sister to the *Lion,* but before the launch important modifications were made in the plans, which delayed her completion. The principal details are: Length, 675 ft.; beam, 90 ft.; draught, 30 ft.; displacement, 28,500 tons—full load about 32,000 tons. She has turbines of the Brown-Curtis system designed for 87,500 horsepower, equivalent to 28 knots. She carries the same main armament as the *Lion,* but mounts a more powerful auxiliary battery, viz., twelve 6-inch guns.

In August, 1914, sixteen light cruisers of the *Arethusa* and *Calliope* classes were completing or building, and four others had been authorized. Generally speaking, these twenty ships were of uniform type, and had the following characteristics: Displacement, 3500 to 3750 tons; speed, 30 knots—Parsons or Brown-Curtis turbines, Yarrow boilers, oil-fired—armed with two or three 6-inch Q. F., several 4-inch Q. F., and four deck torpedo tubes. There was a thin armor belt in conjunction with protective decks. A slightly larger and faster class includes the *Caledon, Calypso, Curaçao, Cardiff, Coventry,* etc., launched 1916-17, displacing 4000 tons, with a speed of 32-33 knots, and armed with six 6-inch Q. F. The *Brisbane* and *Adelaide* were built in Australia, the former being completed two years ago, while the latter was launched this year. They belong to the *Town* class, displace 5600 tons, and have a speed of 25 knots, the armament consisting of eight or nine 6-inch Q. F. *Chester* and *Birkenhead* were originally laid down in England for the Greek Government as the *Condouriotis* and *Lambros Katsonis,* but were purchased by Great Britain at the opening of hostilities. They are of 5500 tons, with a speed of 25.5 knots, and are armed with eight 5.5-inch Q. F. Although the foregoing list is probably incomplete, it is enough to show that since 1914 the British Navy has been very powerfully reinforced by light cruisers.

A special type of vessel was designed early in the war for mine-sweeping, anti-submarine work, and general patrol duties, known officially as the *Acacia* class and popularly as the *Herbaceous* class. Considerably more than 100 representatives of this type have been built, the principal details being: Length, 262 ft.; displacement, 1800 tons; speed, 16 to 18 knots, armed with one or two 6-inch Q. F and smaller guns; depth charges, etc.

A considerable number of new gunboats has been added to the navy, among them being five vessels of the *Soldier* class, 1500 tons and 16 knots speed, built in Japan for service in the Far East. Another group, known as the *Insect* class, was built by Messrs. Yarrow especially for

service in Mesopotamia, the main details being: Length, 230 ft.; beam, 36 ft.; displacement *circa* 1000 tons; armament, two 6-inch and smaller Q. F. Twelve smaller gunboats, known as the *Fly* class, were also built in England, shipped in sections to Abadan, Mesopotamia, and there assembled and armed for service on the Tigris and Euphrates. Dimensions: Length, 120 ft.; beam, 19.7 ft.; draft, 2.6 ft.; armed with one 4-inch., also 6-pounder Q. F. and machine guns.

Of the 200 or more destroyers which have been completed since the outbreak of war full particulars are not yet available, but they are understood to be similar in many respects to the *L* and *M* classes completed between 1913-1915. Displacements range from 965 to 1000 tons, speed nominal, from 30 to 35 knots, and the armament comprises three or four 4-inch Q. F., one 3-inch anti-aircraft gun, and four 21-inch torpedo tubes. In all the later boats broadside fire has been increased by adopting the center-line position for all guns.

A larger class of destroyers, known as flotilla leaders, completed during the war, comprised at least 13 boats. They are understood to displace about 1200 tons, with a designed speed of 32 knots, and to be armed with four 4-inch Q. F., one 3-inch A.-A. gun, and four torpedo tubes.

We would emphasize the fact that the vessels enumerated in the foregoing do not by any means include *all* the new construction undertaken for the British Navy since the outbreak of war, and that the particulars may need correction, but the information given is sufficient to convey some idea of the huge scale of naval construction in this country, during the past four years.—*The Engineer*, 29/11.

Note: No information regarding battle cruisers, submarines or monitors, etc.

Destroyers, as is well known, have played a leading part in the defeat of Germany at sea. Not merely did they get home again and again on the German Fleet as it fled from the Jutland battle, but the destroyers have been the terror of the U-boat. For obvious reasons it has not been possible to publish until now any details of the more recent of our additions to these craft, but the declaration of the armistice has relaxed the restrictions in vogue, and we are thus enabled to give an illustration and some particulars of the destroyer *Mounsey*, the boat which, under the command of Lieutenant Craven, saved, under circumstances of very great difficulty, no less than 696 lives when the *Otranto* was torpedoed on October 6 last. The sea at the time was exceedingly rough, and it would have been fatal to have brought a lightly constructed vessel like the *Mounsey* alongside of the cruiser. The saving of life was therefore effected by maintaining the *Mounsey* under way, so that she passed the *Otranto* within a few feet, allowing the people to jump from one ship to the other. The maneuver had to be repeated many times, and was, under the circumstances, a very original and successful method of rescuing those endangered without great risk to the destroyer herself.

The *Mounsey* was built by Messrs. A. F. Yarrow and Co., Ltd., at their Scotstoun works, and on her measured mile trials attained a speed of over 39 knots. This trial was run with the boat fully armed and equipped, and with sufficient fuel on board for a run of 1000 miles at an economical speed. Further particulars are given below:

Length between perpendiculars	260 ft. 3 in.
Length overall	271 ft. 6 in.
Beam	25 ft. 7½ in.
Depth, midships	16 ft. 3 in.
Total heating surface	22,017 sq. ft.
Four hours' trial—	
Draft forward, 8 ft. 1½ in.; draft aft, 8 ft. 2¾ in.	= 835.3 tons at yard.

Speed, 4 hours .....38.605 knots.
Speed on measured mile .....39.018 knots.
Revolutions per min., 4 hour trial .....685.6.
Revolutions per minute on measured mile trial .....693.02.
Oil consumed in 4 hours .....57.33 tons.
Load on trial .....158 tons.
Oil fuel capacity .....228 tons.
Radius of action at full speed .....615 miles
Armament—
Three 4-inch quick firers; two 2-pounders; two twin 21-inch torpedo tubes.
Complement—79.

PARTICULARS OF RUNS ON MEASURED MILE

No.	Hour, p. m.	Boiler steam	Vacuum	Air pressure	Revolutions	Time on miles	Speed
1.....	1.45	259	28	6.5	689.0	1-32.4	38.962
2.....	1.54	257	28	6.5	692.0	1-32.4	38.962
3.....	2.4	257	28	6.5	693.0	1-32.2	39.056
4.....	2.13	258	28	6.5	693.5	1-32.0	39.130
5.....	2.24	258	28	6.5	694.0	1-33.0	38.710
6.....	2.34	259	28	6.5	692.75	1-31.4	39.388
Mean on measured mile.....		258	28	6.5	693.023	.....	39.018
Mean in 4 hours..		258	28	6.4	685.6	.....	38.605

—*Engineering*, 13/12.

BRITISH SUBMARINES DESTROY MANY ENEMY CRAFT.—Details can now be given of the part which British submarines played during the war. This service destroyed the following enemy warships:

Two battleships, two armored cruisers, two light cruisers, seven destroyers, five gunboats, twenty submarines and five armed auxiliary vessels.

Three battleships and one light cruiser were torpedoed but reached port badly damaged.

Other enemy craft destroyed were:

One Zeppelin, fourteen transports, two ammunition and supply ships, two more ships, fifty-three steamships and 197 sailing ships.

In no case was a merchant ship sunk at sight. Care was taken to see the crews of all vessels got away safely.

In addition to carrying out their attacks on enemy war craft, the submarine commanders carried out 24 cruises, totaling 22,000 miles, which probably constitutes a record for any submarine.—*Naval Monthly*, 18/12.

NORTH SEA BLOCKADE.—The First Lord of the Admiralty (Sir Eric Geddes), speaking at the "Sea Power Exhibition" on December 4, said it was the blockade which crushed the life out of the Central Empires. Largely that blockade was carried out by the Tenth Cruiser Squadron with its flagship the *Alsatian*, which from 1914 to 1917 held the 800 miles of grey seas from the Orkneys to Icelands, and which had intercepted 15,000 ships conveying succor to the enemy. That service had been performed in Arctic conditions of storm, blizzard, and ice, and yet, in spite of almost impossible conditions, only four per cent of the vessels were missed.—*Army and Navy Gazette*, 14/12.

BRITISH SHIPS SUNK DURING THE WAR.—Sir Eric Geddes states that during the war 2475 British ships were sunk with their crews beneath them, and 3147 vessels were sunk and their crews left adrift. The personnel of the merchant marine service was heavily hit, the total number of casualties exceeding 15,000 men. The U-boats carried on continuous warfare against the fishing fleets; the total number of fishing vessels sunk being 670.—*Scientific American*, 21/12.

CANADA'S SHIPBUILDING IN WAR PERIOD.—Some 360 ships were constructed in Canada for Canadian registry during the period of the war to the end of November. Of the number, 199 were sailing vessels, aggregating 44,135 gross tons, and 160 were steamships, totalling 69,612 tons. In addition, 22 ships were built through the Imperial Munitions Board for the British Government. Of the number, there were 15 each of 1400 net tons and 7 each of 2600 net tons.

Contracts for 42 steel steam vessels, with an aggregate capacity of 255,250 tons, have been placed under the Dominion Government's shipbuilding program; of these, two have been launched at Montreal.

The total capacity of Canadian shipyards is 460,000 tons a year.—*Nautical Gazette*, 14/1.

LOSSES FROM COLLISIONS DURING THE WAR.—It is hoped, says London *Fairplay*, that the serious losses from collision which have been such a feature for the last two years will be sensibly lessened with the cessation of the convoy system. There is still, however, the difficulty due to the "dazzle" system of painting vessels, for, although this system handicapped a submarine commander in judging the position and direction of a vessel, it would handicap the master of an approaching vessel in a similar fashion. The number of vessels sunk by collision in November was eight, and the total number sunk for the eleven months this year is 90. The totals for the three previous years are as follows:

1915	25 vessels.
1916	33 vessels.
1917	66 vessels.

It will be seen, therefore, that under ordinary conditions the total losses for 1918 are likely to reach a figure which is 50 per cent more than in 1917 and 300 per cent more than in 1916.

THE ROYAL AIR FORCE.—For the first time during the war, it is possible to disclose official details of the remarkable fighting aircraft which enabled the Royal Air Force to play so notable and conclusive a part in the aerial defeat of Germany and her Allies. It is well known that during the final stages of the war Great Britain has been turning out large numbers of the fastest and most powerfully armed aircraft in the world. Indeed, the collapse of Germany in the air, which was so noticeable a feature of the last phase of the operations, was largely due to the fact that, not only was she confronted with an air force immensely superior to her own in all those personal qualities which constitute fighting morale, but that she was at last definitely outclassed in the speed, climb and fighting efficiency of the super-aircraft which British inventive genius brought into the field. Roughly, the machines employed by the Royal Air Force upon the fighting fronts may be divided into three groups: (1) Reconnaissance Machines: Used for contact patrol work over the lines, the direction of artillery fire, photography, and general strategical reconnaissance. (2) Heavy Bombers: Capable of travelling long distances without escort, and carrying heavy loads of bombs in addition to defensive armaments. (3) Fast Fighting Scouts: Possessing exceptional climbing powers, heavily armed, and capable of maneuvering at a very high rate of speed.

The earliest type of British reconnaissance machine was the now famous *B.E.-2 C*, designed and produced by the Royal Aircraft Factory at Farnborough. The design was completed just prior to the outbreak of war, a fact which facilitated immediate production for the use of the Expeditionary Force. As far as possible, speed, climb and maneuvering ability were combined, although compared with modern types it was a relatively slow machine, making only 50 miles to 60 miles an hour with the 80 h. p. engine with which it was originally fitted. This was followed by the Armstrong-Whitworth *F K.-8*, fitted with 160 h. p. Beardmore engines which made an average speed of 82 miles an hour and could climb to 10,000 feet in about 27 minutes. Towards the end of 1916, an immense forward stride was taken by the production at the Royal Aircraft Factory of the *R.E.-8* with a 12 cylinder R. A. F. engine. This machine has done the bulk of the artillery observation work in France, directing all big-gun fire and barrage work. At 10,000 feet it has a speed of 92 miles an hour, and can climb to that height in 11 minutes. It is fitted with camera and wireless equipment, and takes photographs of every "shoot." An even bigger advance was marked by the introduction of the *Bristol Fighter*, a long distance fighting reconnaissance machine, capable of travelling at 113 miles an hour at 10,000 feet, and climbing to that height in 11 minutes. Had the war continued, the *Bristol Fighter* would have entirely replaced the *R.E.-8* for long distance artillery work.

Aerial bombing was first undertaken in France by the *Avro*, a machine of moderate speed fitted with an 80 h. p. Gnome engine. The observer's seat was used as a receptacle for the bombs, which were merely thrown overboard without the aid of the scientific bombing sights and elaborate bomb-dropping gear which have since contributed so largely to the wonderfully accurate shooting made during the raids upon Germany. The first British machine specially constructed for bombing purposes was the *Short*, a modified seaplane, fitted with a 250 h. p. engine, and carrying four 112-lb. bombs under each wing. This type, which did most useful work in France, was followed by the *Sopwith 1½ Strutter*, and later by the highly-improved *D.H.-4* and *D.H.-9* machines. The *D.H.-4* machine was originally designed as a fighter, but its trials disclosed such excellent lifting powers that it was converted to bombing purposes. It is capable of climbing to 10,000 feet in nine minutes, and has an endurance of three and three-fourths hours. The *D.H.-4* and *D.H.-8* machines have been fitted with Rolls-Royce, B. H. P., and latterly the Liberty engines.

Finally, the great Handley-Page machines were devised for the bombing of Germany. The first quantity production was begun in August, 1917, and the performance of the machine has justified the highest expectations. It is capable of carrying 2000 lb. weight of bombs in the fuselage, or 1500 lb. to suspend externally. The machines used by the Royal Aircraft Independent Force, in the bombing of Germany have been the Handley-Page, *D.H.-4*, *D.H.-9*, and *Sopwith Camel*. Not until the middle of 1915 were production machines armed with standard equipment. Two of the earliest types were the *F.E.-2 B.* and the *Vickers' Fighter*. Both had an open cockpit, and were equipped with Lewis or Vickers' machine guns. The year 1916 witnessed the introduction of the fixed machine gun firing through the propeller and fitted with the ingenious Constantinesco interrupter gear. Other types followed, rapidly leading up to the *S.E.-5 a*, and lastly the *Sopwith Dolphin*, the best and latest British fighting scout in the field. Both these types were in use at the termination of hostilities. Some idea of the power of these modern aircraft can be gained from the fact that the *Dolphin* travels at 128 miles an hour at 10,000 feet, and climbs to that height in 8¼ minutes. It lands at upwards of 55 miles an hour. The following table shows the performance of the leading British types. (At lower altitudes the machines will, of course, develop higher speeds):

Machine	Speed at 10,000 feet	Time required to climb 10,000 feet	Continuous flight capacity
		Minutes	*Hours*
F. E. 2 B	76	40	$3\frac{1}{2}$
Vickers' Fighter	76	40	$3\frac{1}{2}$
Sopwith 1½ Strutter	103	10	—
Bristol Scout	111	10	$1\frac{3}{4}$
A. W.	88	27	3
Sopwith Camel	118	10	$2\frac{1}{2}$
D. H. 4	120	11	4
D. H. 9 A	120	11	6
Bristol Fighter	113	11	3
S. E. 5 A	126	10	3
Dolphin	128	$8\frac{1}{4}$	$1\frac{3}{4}$

—*Engineering*, 29/11.

BRITISH AIRSHIPS.—In 1909, the Admiralty decided to experiment with rigid airships, the outcome of this decision being *Naval Airship No. 1*, which showed by its failure to rise that it was not a simple matter to construct these vessels, and when lightened by alteration of construction, it broke in two in 1911. It was given out the following year that the prospects of using this type of airship were not sufficient to justify the great cost. The nation that was to be our main enemy in the greatest war of all time thought otherwise, and backed their opinion, continuing to construct and improve on the Zeppelin model, with the result that on many occasions, and notably in their dire need at the battle of Jutland Bank, they reaped the reward of their consistent policy of enterprise and at relatively infinitesimal cost. At the outbreak of hostilities Great Britain had only seven airships, all of the non-rigid type, four of which had been taken over by the Admiralty on December 31, 1913, and of the remaining three, *No. 2* was the model on which all the S. S. (submarine scout) class of vessel have since been based; *No. 3* was an Astra-Torres of trefoil section with internal rigging, and *No. 4* was a Parseval bought from Germany. It was the irony of fate that this particular vessel should have been used to patrol the Channel on the night of August 5 and 6, 1914, following up the declaration of war with that country.

Since then, four types of non-rigid airships have been constructed for naval account in Great Britain—*Parseval, Submarine Scout, Coastal,* and *North Sea*. The second of these is rigged externally to *Eta* patches on the envelopes, these patches deriving their name from one of the four army airships alluded to above, on which they were first used. The two last-named are constructed on the Astra system. The year 1915 saw the first building of small S. S. airships, and they repaid their cost many times over; the original model consisted of an aeroplane body with super-imposed more or less stream-lined envelope; this was followed by S S. *Zero,* a vessel of 70,000 cubic feet capacity, with a blunt-nosed envelope 145 feet in length, and a main diameter of 29 feet. The longest flight of one of these vessels was just under 51 hours. In 1917 the S. S. *Twin* made its appearance, its length is 164½ feet, main diameter about 32 feet, cubic capacity 100,000 feet, the car carries a crew of three, and this class of airship has been found so eminently satisfactory that no more of the previous S. S. models will be built. The motive power is supplied by twin engines, two 75 h. p. Hawks. The *Coastal* type has a capacity of 200,000 cubic feet, and the car will hold five men. Airships of this type did most of the long distance patrols during the last two years, and were largely employed in convoying ships from beyond the Scilly Isles up the Channel. An improved

model of this class known as *Coastal Star* was brought out in January, 1918; it is somewhat larger, and the envelope better stream-lined. The motive power is provided by a 110 h. p. Berliot forward, and a 260 h. p. Fiat aft. The *North Sea* type was designed to act as a scout with the fleet, or to carry out patrols of 20 hours. Its envelope has a cubic capacity of 360,000 feet, and the normal crew is 10 men, but the car will carry 20. Since the signing of the armistice, one of these vessels has made a record voyage for a non-rigid airship of 61 hours 21 minutes, and is understood to have been surpassed on two occasions only by Zeppelins. This class are 262 feet in length, main diameter 55 feet, and they are fitted with two 275 h. p. Eagle or two 260 h. p. Fiat engines. Since 1911 no rigid airship was built in Great Britain till 1916; by January 1, 1918, four of these vessels were in commission. The largest of the four has a capacity of 1,500,000 cubic feet, but larger vessels are under construction. As the rigid vessel has proved its great value for long distance naval reconnaissances, and as the best scout with a fleet, we may expect to see serious attention paid to the development of the type.—*Army and Navy Gazette*, 14/12.

AERIAL COASTGUARD.—*Methods and Machines.*—There were two kinds of anti-submarine patrol, intensive and extensive. The intensive kind was concerned with spotting and escorting in the war channel. This was an area extending from the coast line to a line marked in some parts with numbered buoys about ten miles out. All convoys kept within this line. For inshore work from three to five miles the *D. H.-6* machine was used. The old *D. H.-6*, familiarly known as the *Clutching Hand* and as a *School 'Bus*, was capable of about one and one-half hour's patrol on the average. It was altered in design for this work and turned also into a single-seater, the patrols being usually done in pairs. Further out again went the sea-planes and the *D. H.-9*, often beyond the 30 mile line. The *D. H.-9* had the advantage of greater speed than any other anti-submarine patrol craft, and was, therefore, particularly useful in heavy weather or in a sudden emergency demanding swift action. Beyond this again went flying boats and airships. The war channel was thus patrolled by every form of air-craft, though many went further to sea than the safety line for shipping. German submarines were nearly always sighted within the war channel area. They knew, of course, of its existence, and came there for their prey.

U-Boat Movements and Methods.—All aircraft on these Royal Aircraft Force patrols were under the direction of the senior naval officer of the group to which the squadrons were attached. In this way the machines were used in conjunction with the surface craft and the hydrophone stations, and there was, in fact, splendid and wonderfully effective collaboration between the forces of the sea and the forces of the air. The study of the movements and methods of enemy submarines had become such an exact science that it was often possible to tell in advance when and where to expect the next attack. How true this is may be gauged by the fact that there were scarcely any successful attacks on shipping (attacks after which the submarine escaped) during flying hours. This year the Germans initiated an air offensive against our anti-submarine patrol. It took the form of very fast monoplanes, heavily armed. Consequently we retaliated by escorting our flying boats and other craft with a purely fighting machine, such as the *Sopwith Camel*.

The following figures give a slight idea of the work of the Royal Aircraft Force anti-submarine patrol. They refer only to the half-year since the Royal Aircraft Force became a separate force—from April 1 to October 31 last:

Total number of hours flown	39,102
Hostile submarines sighted	216
Hostile submarines attacked	189
Hostile aircraft attacked	351
Hostile aircraft destroyed	184
Hostile aircraft damaged	151

Hostile mines spotted	69
Hostile mines destroyed by aircraft	32
Total number of bombs dropped	15,313
(This is equal to 661½ tons)	
Total convoy flights	3,441
Total photographs taken	3,440

This brief record of the Royal Aircraft Force coast patrol in home waters does not touch upon the vast air patrol organization in the Mediterranean, and it includes a final period during which German submarine work had greatly decreased.—*London Times*, 16/12.

UNITED STATES

NAVY DEPARTMENT—BUREAU OF CONSTRUCTION AND REPAIR

VESSELS UNDER CONSTRUCTION, UNITED STATES NAVY—DEGREE OF COMPLETION, DECEMBER 31, 1918

Type, number and name	Contractor	Per cent of completion			
		Jan. 1, 1919		Dec. 1, 1918	
		Total	On ship	Total	On ship
Battleships					
42 Idaho	New York S. B. Co	98.5	98.5	98.1	98.1
43 Tennessee	New York Navy Yard	57.4	51.2	51.1	43.8
44 California	Mare Island Navy Yard	51.	36.4	48.4	32.8
45 Colorado	New York S. B. Co	6.8	.4	6.8	.4
46 Maryland	Newport S. B. & D. D. Co	38.9	28.8	38.2	27.3
47 Washington	New York S. B. Co	4.3	.4	4.3	.4
48 West Virginia	Newport S. B. & D. D. Co	18.8	2.1	18.7	2.1
49 South Dakota	Navy Yard, New York	0.	0.	0.	0.
50 North Carolina	Navy Yard, Norfolk	0.	0.	0.	0.
51 Montana	Navy Yard, Mare Island	0.	0.	0.	0.
52	Navy Yard, New York	0.	0.	0.	0.
Battle Cruisers					
1 Lexington	Fore River S. B. Co	0.	0.	0.	0.
2 Constellation	Newport News S. B. & D. D. Co	0.	0.	0.	0.
3 Saratoga	New York S. B. Co	0.	0.	0.	0.
4 Ranger	Newport S. B. & D. D. Co	0.	0.	0.	0.
5 Constitution	Philadelphia Navy Yaad	0.	0.	0.	0.
6	Phila. Navy Yard	0.	0.	0.	0.
Scout Cruisers					
4	Todd D. D. & Const. Co	25.2	1.8	32.4	2.1
5	Todd D. D. & Const. Co	21.9	.9	21.5	.2
6	Todd D. D. & Const. Co	17.6	.6	17.	.2
7	Union Iron Works	0.	0.	0.	0.
8	Union Iron Works	0.	0.	0.	0.
9	Wm. Cramp & Sons Co	9.	....	9.	....
10	Wm. Cramp & Sons Co	9.	....	9.	....
11	Wm. Cramp & Sons Co	....	....	....	....
12	Wm. Cramp & Sons Co	....	....	....	....
13	Wm. Cramp & Sons Co	....	....	....	....
Miscellaneous					
Fuel Ship No. 16	Brazos, Boston Navy Yard	83.0	82.	76.5	75.
Fuel Ship No. 17	Brazos, Boston Navy Yard	0.0	0.	0.	0.
Fuel Ship No. 18	Brazos, Boston Navy Yard	0.0	0.	0.	0.
Gunboat No. 21	Asheville, Charleston Navy Yard	91.	85.	90.	84.
Gunboat No. 22	Asheville, Charleston Navy Yard	0.	0.	0.	0.
Hospital Ship No. 1	Philadelphia Navy Yard	24.	9.	24.	9.
Ammunition Ship No. 1	Puget Sound Navy Yard	60.	52.	53.	41.
Ammunition Ship No. 2	Puget Sound Navy Yard	8.	0.	6.5	0.

NOTE: Above percentages of completion pertain only to work in connection with hulls and fittings; no machinery is included.

There are 229 destroyers, 77 submarines, 31 mine sweepers, 19 seagoing tugs, 40 harbor tugs and 52 Ford boats (*Eagle* class) in various stages of completion.

NAVAL STRENGTH IN 1920.—Rear Admiral Taylor, Chief of Naval Construction, told the House Naval Affairs Committee that when the 1916 program of construction and the program laid down during the war have been completed, the navy will have over twice the number of ships it had before the outbreak of the war, this being exclusive of 350 wooden submarine chasers, which the navy expects to sell or put out of commission. Destroyers represent the backbone of the increase. Of these we have 100 in commission, and 240 more will be added in the next 18 months. By July, 1920, the total number of vessels will be over seven hundred.—*Scientific American*, 21/12.

THE AMERICAN DESTROYER.—By far the most important part of our wartime program was that which called for the immediate construction of a large fleet of destroyers.

The majority of these, in fact, all of the vessels built since the war commenced and now under contract, are of the new 1200-ton type. The water line length is about 320 feet, the beam about 32 feet, with a draft of between 10 and 11 feet, according to load. As compared with our earlier 750-ton destroyers of the *Nicholson* class, this represents an increase of about 400 tons displacement, and the speed has been raised from about 30 to 35 knots. They are driven by turbines through mechanical reduction gear, and we understand that in service these boats have easily made 35 knots speed or more and that the motive power has proved to be thoroughly reliable.

The most notable feature in a first view of these vessels is the disappearance of the separate fo'c'sle deck with a break aft of the bridge to the level of the main deck, and the substitution of a flush deck from stem to stern. There is the same high freeboard forward as in the early destroyers—in fact, the freeboard is considerably greater, and of course the average freeboard of these vessels is several feet in excess of that of the old type. There is also, due to this construction, a considerable increase in strength, since the girder depth of these boats, and consequently their ability to resist bending stresses, is greatly increased for similar weights of material. The experience had with them in the stormy waters of the eastern Atlantic has shown that they are very strong and exceedingly able craft.

The armament consists of four long 4-inch rifles, one on the foc's'le deck, one aft, and two carried on a raised structure somewhat forward of amidships. In the early boats these two guns were carried on the beam at the break of the fore deck, and the lifting of them from the main deck to the level of the fo'c'sle deck, that is, through a height of seven to eight feet, gets them out of the way of broken water and gives them a much better command at all times.

The armament of a destroyer to-day is vastly different from that of prewar times, for, in addition to guns and torpedoes, it includes the terribly destructive depth bomb. These are carried on sloping run-ways at the stern. When an attack is made they are released, one by one, and fuses are set so that the detonation shall take place as near to the estimated position of the U-boat as possible.—*Scientific American*, 28/12.

POLICY

NAVY STATIONS ABROAD TO BE KEPT UP A YEAR.—American naval stations will be maintained for at least a year at Brest, Gibraltar, and in the Azores to render aid to American merchant ships. The consent of France, England, and Portugal has already been obtained. The aero and radio stations at these points will be in readiness to respond to calls for aid by American shipping in distress, and facilities will be afforded for needed repairs and supplies.

The other naval establishments in Europe have been ordered abandoned as rapidly as possible, and progress in this direction has already been con-

siderable. The United States Navy had 27 aero stations along the European coast, the material of which, except at Brest, Gibraltar, and the Azores, is being shipped home. Naval transports, relieved of carrying munitions, will hereafter convey food supplies.—*N. Y. Times*, 19/12.

TO HAVE FEWER CHANGES OF U. S. FLEET OFFICERS.—Secretary Daniels is planning a reorganization of naval practice to stop the frequent changes of officers aboard the ships of the fleet, which have been the rule during the war. Commanders of the big ships have objected to having their ships' companies constantly broken up. The Secretary said to-day that immediately after the naval review in New York harbor next week he expected to have conferences on the subject with Admiral Mayo, commanding the Atlantic fleet, and Rear Admiral Blue, the new chief of the Bureau of Navigation.—*Wash. Evening Star*, 22/12.

NAVY TO COMPRISE TWO GREAT FLEETS.—*One for Pacific and Other for Atlantic Coast to War in Summer Maneuvers.*—To keep the navy "fit and on its toes," two great fleets, one based on the Pacific Coast and the other on the Atlantic Coast, will be established by next summer with war games and joint maneuvers as a part of a regular program of training.

Secretary Daniels, in explaining his plans to the House Naval Committee to-day, said that after every war there was a tendency for the navy to retrograde, and that the fleet division had been determined upon to prevent any slump. The plan, he said, had received the "enthusiastic indorsement" of Admiral William S. Benson, Chief of Operations, now in Europe with the peace delegation.

"An admiral who can stay long enough to stir up ambition" will be placed in command of each fleet, Mr. Daniels said, and all officers will be kept on their ships for two years. In effect, the Secretary added, there will be a war between the Atlantic and Pacific fleets, "which will so stimulate keenness that it will make the men feel they are in actual war."

Mr. Daniels did not indicate to the committee how many ships would be in each fleet. It is assumed, however, that there will be an equal distribution of the capital ships, most of which heretofore have been kept on the Atlantic Coast. During joint maneuvers the combined fleet will visit each coast, so as to give the people on the Atlantic and Pacific seaboards an opportunity to see the full naval force.

Mr. Daniels also told the committee that during peace times the submarine bases at San Diego, Cal., Key West, Fla., and New London, Conn., and the air defence stations at San Diego and Pensacola, Fla., will be retained.

The principal training stations for seamen in the east will be in Chicago, Hampton Roads, and Newport, R. I.—*N. Y. Times*, 1/1.

MATÉRIEL

BUREAU OF YARDS AND DOCKS HAS BUSY YEAR.—The annual report of the Bureau of Yards and Docks shows that for the fiscal year 1918, there was an expenditure in this department of $193,164,458. Three drydocks, at Norfolk, Pearl Harbor and Charleston, have been under construction, shipbuilding facilities were installed or improved at New York, Philadelphia, Norfolk, Charleston, Mare Island and Puget Sound.

Camps were erected for 168,875 men at a cost of $45,437,000. A naval aircraft factory was contracted for, and emergency hospitals were erected in many places. Six hundred and eighty-two contracts were executed during the year, while seven hundred and thirty-five were let, involving $84,700,000.—*Naval Monthly*, January.

PERSONNEL

FOR YEAR'S NAVAL FORCE OF 225,000.—*House Committee Fixes Number Effective From July 1. No Permanent Provision.*—A temporary naval force of 225,000 enlisted men for the year beginning next July was decided

on to-day by the House Naval Subcommittee, in beginning the work of framing the naval appropriation bill. This force is 25,000 less than was recommended by Secretary Daniels.

No provision will be made in the bill, the committee decided, for increasing the permanent strength of the navy, now fixed at 142,000 men. This decision was in accord with Secretary Daniels' recommendations that permanent increase should await a study of ship complements that is to be made during the summer by the naval officials.

Indicates Retrenchment.—However, the committee's action in adopting a plan calling for fewer men than recommended by the Secretary was regarded as indicating that the committee plans reduction of department estimates for the year. Committee members pointed out that appropriations depend more or less on the personnel.

The permanent force of the navy, it is expected by the committee, will rate the strictly naval craft, with 20,000 men of the temporary force being used for the army transport service and the remainder for manning shipping board vessels.

In deciding on the personnel force, committee members regarded a complement of 1000 men, exclusive of officers, as sufficient for the dreadnoughts and battle cruisers for peace time, this being a reduction from the basis of 1200 to 1400 men. The committee also discussed placing in service a part of the destroyers and 110-foot submarine chasers, now in the navy, as also some of the *Eagle* patrol boats that are being built.—*Washington Evening Star,* 10/1.

OPERATIONS

SEEK TEUTON SHIPS TO BRING OUR TROOPS.—*America and Britain to Give Food to Austria and Germany in Return.*—American and British representatives will hold a conference with German Admiralty authorities at Treves, Wednesday, to acquire possession of German and Austrian passenger ships for the transportation of troops. The United States will be represented by E. N. Hurley, Chairman of the Shipping Board, and Admiral W. S. Benson. Admiral Brown, will represent Great Britain.

It is proposed that America give Austria and Germany food in return for the ships. It is planned that the British will get smaller ships for the return of troops to Australia and Canada, while America will have the big boats, which will include virtually all the Hamburg-American liners, including the *Imperator.* This division is suggested because the bigger liners are too large for Australian or Canadian harbors.

If this arrangement becomes effective, it will increase the flow of troops to America about 70,000 per month. This will make a total capacity of shipping approximately 170,000 men each month.—*N. Y. Times,* 14/1.

MERCHANT MARINE

WORLD'S NEW VESSEL CONSTRUCTION.—*U. S. Building More Ships Than all Other Countries Combined.*—Merchant vessels under construction throughout the world at the end of September aggregated 6,371,388 gross tons. This includes 1966 steam vessels of 6,258,194 tons and 178 sailing vessels of 113,194 tons. The figures are furnished by Lloyd's Register of Shipping for the quarter ended September 30.—*Nautical Gazette,* 4/1.

AMERICAN SHIPS GO BACK TO OWNERS.—*Government Will Retain Only Those Now Engaged in Army Service.*—All American ships which have been requisitioned by the government during the war have been released to their owners, with the exception of those engaged in army service, it was announced yesterday by the United States Shipping Board. In the place of those retained for service and which are fitted for the transportation of troops, the owners will receive an equal tonnage of government built and owned vessels. A. E. Clegg, Assistant Director of Operations, said that all the ships referred to now in American ports would be turned over to their owners at once; those on voyages would be released on their return to the United States.

TABLE SHOWING TOTAL OF UNITED STATES TROOPS TRANSPORTED AND THE SHIPS THAT CARRIED THEM

Prepared by Ensign Walter Logan, U. S. N., Statistical Officer, Cruiser and Transport Force, United States Atlantic Fleet

	Carried by United States naval transports	Number of United States naval transports sailed	Carried by British ships	Number of British ships sailed	Carried by British-leased Italian ships	Number of British-leased Italian ships sailed	Carried by other United States ships	Number of other United States ships sailed	Carried by other (French, Italian, &c.)	Number of other ships sailed (French, Italian, &c.)	Total United States troops transported	Total ships sailed	Percentage carried by United States naval transports	Percentage carried by British ships	Percentage carried by British-leased Italian ships	Percentage carried by other United States ships	Percentage carried by other ships	Under United States naval escort	Under British naval escort	Under French naval escort	Percentage under United States naval escort	Percentage under British naval escort	Percentage under French naval escort
1917																								
May	1,035	3	508	2	0	0	0	0	0	0	1,543	5	67	33	0	0	0	258	1,285	0	83	83	0	0
June	8,855	9	1,080	1	0	0	5,156	8	0	0	15,091	18	59	64	0	0	0	15,032	59	0	99	1	0	0
July	5,281	8	7,299	6	0	0	0	0	296	1	12,876	15	41	57	0	0	34	10,063	2,566	247	783	20	14	14
Aug.	4,310	6	11,890	7	0	0	1,109	2	2,094	2	19,403	17	22	61	0	0	6	12,259	4,120	3,015	63	21	16	16
Sept.	13,917	15	19,671	12	0	0	0	0	0	0	33,588	27	41	59	0	0	0	17,433	12,898	3,256	519	39	9	9
Oct.	25,098	14	13,013	9	0	0	0	0	1,916	1	40,027	24	62	32	0	0	5	36,893	3,134	0	928	7	0	0
Nov.	9,988	9	10,669	7	0	0	1,235	2	1,830	1	23,722	19	41	46	0	0	8	13,246	10,476	0	564	43	0	0
Dec.	37,445	16	11,370	9	0	0	0	0	0	0	48,815	25	77	23	0	0	0	42,783	6,032	0	874	12	0	0
1918																								
Jan.	25,662	16	20,514	9	0	0	0	0	1,879	1	48,055	26	53	42	0	0	4	35,827	12,228	0	75	25	0	0
Feb.	39,977	17	9,259	4	0	0	0	0	0	0	49,239	22	81	18	0	0	0	48,795	444	0	99	1	0	0
Mar.	56,278	26	27,626	14	0	0	1	1	1,895	4	85,710	45	65	33	0	0	2	73,098	12,615	0	85	15	0	0
April	87,553	27	47,362	20	2,626	2	737	11	1,794	4	120,072	63	56	39	2	1	1	91,308	28,764	0	781	244	0	0
May	96,273	33	133,795	75	12,127	6	3,288	22	2,231	5	247,714	141	39	53	5	1	1	220,463	26,652	599	889	11	1	1
June	115,296	36	140,172	70	14,405	7	6,003	11	4,538	4	280,434	128	41	50	5	2	1	244,631	30,912	4,891	871	11	1	1
July	108,445	33	175,526	89	11,502	7	4,020	13	11,866	5	311,359	147	35	56	3	1	1	258,332	46,329	6,698	83	15	2	2
Aug.	116,401	36	137,745	74	9,376	6	8,495	15	14,358	5	286,375	140	41	48	3	3	5	237,920	22,572	25,883	83	8	2	2
Sept.	107,025	35	134,576	69	7,052	4	5,511	18	5,506	3	259,670	129	41	52	3	2	2	224,298	20,681	14,691	86	8	2	2
Oct.	72,092	43	94,214	57	11,098	7	4,709	17	1,950	3	184,063	127	39	51	6	3	1	130,274	51,454	2,335	701	288	1	1
To Nov. 11.	1,191	9	10,668	12	0	0	235	3	0	0	12,124	24	10	88	0	2	0	7,451	4,673	0	67	38	0	0
Total	912,082	391	1,006,987	546	68,246	39	40,699	133	52,066	43	2,079,880	1,142	438	481	3	24	24	1,720,360	297,903	61,617	842	144	33	

In addition to the return of requisitioned ships to their owners and replacement of vessels in government service, 34 ships of 275,194 deadweight tons, owned by the Shipping Board were to-day allotted to various lines by the board. A report showed that on January 9 there were under requisition 248 American ships, of a total of 1,219,283 gross tons. Of these possibly 75 are in the service of the War Department as troop and supply ships.

The total number of ships owned by the board is 636, of 2,348,250 gross tons, of which 534, of 1,994,913 tons, are new vessels; 59, of 257,962 tons, are former German ships; 6, of 24,417 tons, former Austrian ships, while 37, of 100,962 tons, are former Great Lakes ships.—*N. Y. Times*, 17/1.

U. S. SHIPBUILDING OUTPUT FOR 1918.—American shipyards built 1882 vessels of 2,721,281 gross tons in 1918. Reports of the Bureau of Navigation of the Commerce Department show this total, of which all but 124,000 tons represented seagoing ships, the seagoing steel tonnage alone aggregating 1,861,321 gross tons. The bureau's figures for 1917 construction show that 1,034,000 gross tons were constructed by American shipyards.

The armistice brought about a decided setback in the yards' output. November was the month of greatest construction in the history of American shipbuilding, 171 vessels of 357,660 gross tons of seagoing ships being produced. In December only 153 ships were completed and the tonnage amounted to 283,359.—*Nautical Gazette*, 11/1.

REMOVING GUNS AND GUN PLATFORMS FROM AMERICAN MERCHANT VESSELS.—The United States Shipping Board issues the following:

Guns and gun platforms are being removed from American merchant ships in overseas trade as rapidly as they arrive at home ports, the United States Shipping Board announces.

On vessels operated by the board the gun emplacements, usually heavy steel platforms on high supports at bow and stern, are being cut away and dumped on the dock without ceremony.

With the removal of guns the gun crews carried during the submarine war go back to their naval duties.

Changes Considered Important.—The changes thus effected are considered by the Shipping Board an important factor in the work of manning the merchant marine on a basis demanded by peace conditions. During the progress of the war living conditions on merchant vessels were abnormal, owing to congestion. Vessels carrying 12 merchant sailors in their deck force often had naval gun crews of 15 men. These occupied the regular crews' quarters, which the merchant sailors cheerfully gave up, accepting such emergency quarters as could be provided for them.

The Shipping Board is now returning the crews on its vessels to the kind of quarters they were accustomed to occupy before the war, although the forecastle is now toward the stern instead of at the bow of the ship. Danger from mines prompted the change originally, and the arrangement was found so satisfactory that it will be retained.

With proper berth space again available, the Shipping Board plans to use the merchant ships in a broad program for the training of the additional personnel that will be required for new vessels now coming out.

Spare room in the quarters now being vacated by gun crews and elsewhere will be set aside by the Shipping Board, on each of the vessels which it operates, for the accommodation of apprentices, and for four junior deck officers and four junior engineer officers. The latter will be carried in addition to the usual number of officers on the ship, for purposes of special training, following technical instruction ashore at the board's free engineering and navigation schools. It is expected that the new arrangement will absorb a present surplus of junior officers that has resulted from the work of these schools, which have graduated 6799 navigating officers and engineers since this country entered the war.

Three Months' Sea Training.—Three months' training at sea will be the maximum given a junior officer before he receives his license, and is shipped on another vessel as a regular officer. He will not be a "green hand" when he begins his training, as only experienced men are trained at the board's schools.

Apprentices for the merchant ships will be taken from the board's training ships, and will be trained as part of crews on merchant vessels, in the duties of ordinary seamen, firemen, messmen, or cooks.—*Official Bulletin*, 6/1.

DISCONTINUANCE OF NAVAL REGULATION OF UNITED STATES MERCHANT SHIPS.—The U. S. Shipping Board have authorized the following statement, relative to the discontinuance of naval regulation of merchant ships. At the same time intimation is given of their intention to hereafter man all merchant ships with merchant sailors:

"The Shipping Board announce through its acting chairman, that, in consequence of the elimination of the submarine danger, with the attendant discontinuance of the convoy and other naval regulations which governed the movements of cargo vessels during the war emergency, it has been decided to man all out-coming vessels, excepting for the present, those steamers engaged in the transport of troops, with merchant sailors.

"In making this decision the board has been guided by the necessity of restoring the usual commercial conditions governing the operation of merchant vessels, as rapidly as possible, in order to enable the ordinary competitive conditions to be met. During the war, it was for military reasons considered proper that many of the vessels should be under naval regulations as they were so peculiarly but instruments of our military operations in Europe, and the splendid service rendered by the officers and men of the naval reserve force in this service is fully recognized. There have also been operated through the submarine and mine infested waters, many merchant vessels manned by the usual merchant crews. The board is fully conscious of the great service rendered by these men in a most difficult and dangerous trade, and desires to publicly express its appreciation of the part played by the merchant sailor in winning the war."—*Shipping*, 4/1.

CREW PLACING FOR SHIPPING BOARD CRAFT.—The U. S. Shipping Board on December 24, announced that beginning with the New Year, crews for all merchant vessels operated by the board will be placed in employment through a central agency to be known as the Sea Service Bureau of the U. S. Shipping Board. This agency will have offices in principal American ports, and through it not only seamen but masters, mates and engineers—in fact, the proverbial "all hands and the cook,"—will be signed on for sea duty—*Shipping*, 4/1.

ONE HUNDRED AND FORTY-FIVE MERCHANT SHIPS LOST BY U. S. IN WAR.—Loss of 145 American passenger and merchant vessels of 254,449 tons and 775 lives through acts of the enemy during the period from the beginning of the world war to the cessation of hostilities, November 11, is shown by figures made public recently by the Department of Commerce's Bureau of Navigation.

The report does not include several vessels, the loss of which has not been established, as due to acts of the enemy.

Nineteen vessels and 67 lives were lost through use of torpedoes, mines and gunfire prior to the entrance of the United States into the war.—*Naval Monthly*, December.

NEW WAGE SCALE FOR STEAMSHIP OFFICERS.—New wage scales for licensed officers of all steamships plying from Atlantic and Gulf ports have been promulgated by the Shipping Board, effective from January 1 to May 1. They are based on the size of the vessels, which are divided into five classes.

are the same as the present rate paid in the coastwise traffic and do not contemplate the payment of bonuses in any form whatever.

Masters will receive from $300 to $375 a month, depending on the size of the ship; chief engineers, from $212.50 to $287.50; first officers and first assistant engineers, $181.25 to $206.25; second officers and second assistant engineers, $162.50 to $187.50; third officers and third assistant engineers, $143.75 to $168.75; fourth officers and fourth assistant engineers, $143.75 to $150, and junior engineers, $125.

"Wage increases which might have been favorably considered during conditions of warfare would not now be warranted, owing to the unsettled conditions following cessation of hostilities," said the award. It was added, however, that as there was no immediate prospect of reduction in the cost of living the present rate of pay in the coastwise service should not be diminished, but should be made universal for all services from Atlantic and Gulf ports, including West Indian, South American and trans-atlantic services.

The new scale is mandatory on all vessels owned or under requisition by the Shipping Board. A difference of opinion, however, was said to have arisen among members of the commission making the award as to the extent to which the award should be mandatory on other American vessels, inasmuch as the armistice was signed after the agreement for the arbitration of the wage scale was made. Owing to the continued pressing national necessity in relation to shipping, however, the board urged that all private owners and operators of vessels not requisitioned should pay the scale voluntarily to promote stability of conditions and prevent interruption of traffic.—*Nautical Gazette*, 4/1.

OFFICE OF SUPERCARGO REVIVED.—The Division of Operations of the U. S. Shipping Board is at present engaged in organizing a force of men who will be its personal representatives and therefore accredited officers of the government on board government owned merchant vessels. The Shipping Board has revived for these men the ancient and honorable title in the American merchant service of "Supercargo." It will be the duty of these officers to make direct report to the Division of Operations regarding the performance of the ship on each voyage, the handling of the cargo, and in general all other matters in which the Division of Operations as representing the owners of the ship may be expected to have an interest. To fill this important and responsible position the Division of Operations needs alert, ambitious and intelligent young men of good character. A certain amount of sea experience and training, and knowledge of the steamship business and overseas commerce in general, is desirable although not essential. In return for this the Shipping Board offers an initial salary of $175 per month in addition to subsistence. Mr. George Eggers, Chief of the Bureau of Accounting Personnel, Division of Operations, of the U. S. Shipping Board in Washington, has been placed in charge of the selection of men for these posts.—*Army and Navy Journal*, 11/1.

ORDNANCE AND GUNNERY

BUREAU OF ORDNANCE

SEVEN-INCH TRACTOR MOUNT, MARK V

General Description, See Illustration, Page 278

1. The 7" naval tractor mount, Mark V, is a mobile, track-laying field piece bearing a 7", 45-caliber naval rifle. Projectiles weighing 153 pounds may be fired at angles of elevation from horizontal to 40 degrees, with muzzle velocity of 2800 foot seconds. At the maximum elevation the extreme range is 25,000 yards. The recoil system is of the liquid type; the gun is returned to battery by a pneumatic countercoil system. A traversing gear, incorporated in the carriage trail, permits of limited training either

SEVEN-INCH NAVAL TRACTOR MOUNT, MARK V.

side of the center line. When a greater range of training is desired, the mount is either shifted on the ground or is mounted upon a firing platform which provides for training through a firing angle of 60 degrees. The track layer, which is of the double-tread caterpillar type, is designed to carry the mount over practically any kind of ground likely to be encountered in service. The proportions of the chain tracks are such as to produce a pressure of about 12 pounds per square inch upon the soil during transportation, which is approximately half that exerted by a horse.

2. The track layer also serves as a stand or foundation for the mount during action. A 120 h. p. gas-engine driven caterpillar tractor is used to draw the mount from one position to another. A limber hooked between the mount and the tractor supports the trail during transit. During action the limber and the tractor are withdrawn from the immediate field of danger. A shell loading tray, which rests on the carriage trail, is used to load shells into the breech.

GUNS MADE DURING WAR.—During the 20 months from the date of the entry of the United States into the war to last December 1, 2841 guns of medium caliber were manufactured under the direction of the Naval Bureau of Ordnance at gun-manufacturing plants, Secretary Daniels told the committee. Of this number, 1887 were placed in actual service against the enemy.

Secretary Daniels explained that the total number of 2841 did not include guns that were on hand and in reserve on April 5, 1917, nor those of a larger caliber than five inches. The great majority were manufactured in plants placed in operation since the beginning of the war, he said, and every one was complete with mounts, sights and all accessories.

When hostilities ceased 5-inch guns were being delivered at the rate of 30 a month, 4-inch guns at the rate of 70 a month and 3-inch guns at the rate of 100 a month. During the 20 days after the signing of the armistice 805 guns were delivered to the navy.—*Washington Evening Star*, 2/1.

COMPARATIVE CHART ON THE PRODUCTION OF RIFLES, MACHINE GUNS, AMMUNITION BY U. S., GREAT BRITAIN, AND FRANCE.—The War Department authorizes the following from the Statistics Branch, General Staff:

The following is a comparative chart on production in France, Great Britain, and the United States on rifles, machine guns, and ammunition, the source of this information being the Ordnance Department, Interallied Bureau of Statistics:

AVERAGE MONTHLY RATE, JULY, AUGUST, AND SEPTEMBER, 1918

Machine guns and machine rifles:	
Great Britain	10,947
France	12,126
United States	27,270
Rifles:	
Great Britain	112,821
France	40,522
United States	233,562
Rifle and machine gun ammunition:	
Great Britain	259,769,000
France	139,845,000
United States	277,894,000

TOTAL PRODUCTION APRIL 6, 1917, TO NOVEMBER 11, 1918

Machine guns and machine rifles:	
Great Britain	181,404
France	229,238
United States	181,662

Rifles:	
Great Britain	1,971,764
France	1,416,056
United States	2,506,742
Rifle and machine gun ammunition:	
Great Britain	3,486,127,000
France	2,983,675,000
United States	2,879,148,000

British and French production for October and the first part of November was estimated at the same rate as the preceding three months. Ammunition figures for the United States include ball cartridges cal. 30, and 8 mm. of service, incendiary, armor-piercing, and tracer types. Since the need for the original equipment of troops no longer existed, French and British production of rifles during 1918 was at a lower rate than had previously been attained.—*U. S. Bulletin*, 15/1.

In his annual report to the Secretary of War Maj. Gen. F. W. Coe, Chief of Coast Artillery, says that a gun of 24-inch caliber to shoot 40 miles is among the near possibilities. On other matters the report says:

In order that the general trend of development in heavy artillery may be studied and applied properly to seacoast defence, it is desirable to state the general features of this development and to suggest the principles which appear to underlie their application.

Gun Power.—This has increased both in range and the caliber of the gun. Guns of 24-inch, ranging to 40 miles, may be realized, while longer ranges for special types are possible if desired.

Mobility.—Guns of the largest caliber are transported on their firing carriages by rail. The calibers of tractor-drawn matériel have increased materially, and it is unlikely that the limits have yet been reached.

Aeroplane Bombardment.—Although this is not a strictly artillery development it should be considered in connection with the effects of artillery fire inasmuch as the aeroplane may be regarded as taking up these effects at the longer ranges and projecting them far back into enemy territory.—*Official Bulletin*, 17/12.

NAVIGATION AND RADIO

NAVAL CONTROL OF WIRELESS.—The Navy Department has purchased all of the radio stations except four high-power stations of the Marconi Wireless Telegraph Company of America. The stations sold by the company are 45 in number, of which 19 are on the Atlantic and Gulf coasts, 16 on the Great Lakes and 10 on the Pacific Coast. The Navy Department has purchased from the Alien Property Custodian the radio station at Sayville, L. I., formerly controlled by German interests and intended for transatlantic wireless traffic.—*Scientific American*, 11/1.

The report of the United States Hydrographer, Rear Admiral Seaton Schroeder, United States Navy, retired, on the operations of the Hydrographic Office during the fiscal year says, in part:

The Hydrographic Office continued to supply charts and sailing directions as needed for the navy and other public services, and the mercantile marine. An increasing demand has also been met for manuals of instruction in navigation called for by various schools and colleges maintaining navigation classes, and by young reserve men and others aspiring to become officers in the navy or the mercantile marine.

Independent of Other Nations.—It has long been recognized by all who have had opportunity to observe the working of this office from within, or to use its products, that it should be brought to a position of independence of foreign sources for maintaining its supply of charts and sailing directions

for not only vessels of the navy but for other public services and for vessels of the mercantile marine. Before the present European war had progressed many months it had become evident that what had been a desideratum was fast becoming a necessity, as foreign sources for such vital material were being very greatly curtailed or wholly closed. Our entry into the war made it an absolute *sine qua non;* and, although the final result can not be immediately achieved of covering the more remote untraveled seas with our charts and sailing directions, the office has been definitely brought to a position of virtual independence and self-support.—*Official Bulletin.* 28/12.

ENGINEERING

THE "EAGLE" BOATS.—The design of the *Eagle* boats was worked out at the Highland Park plant of the Ford Motor Company under the direction of naval officers. Admiral D. W. Taylor and Captain Robert Stocker planned the hull with the aim of eliminating curved sections as much as possible. Straight lines characterize the design throughout to a startling degree. The boilers and turbine were designed by direction of Admirals Griffin and Dyson and Commander S. M. Robinson. The Ljungstrom turbine with planetary reducing gear was used with success. Hull manufacturing methods were worked out under the supervision of Mr. Charles C. West of the Manitowoc Shipbuilding Company, and Commander Carlos Bean of the navy was appointed executive in charge of the development of the power plant.

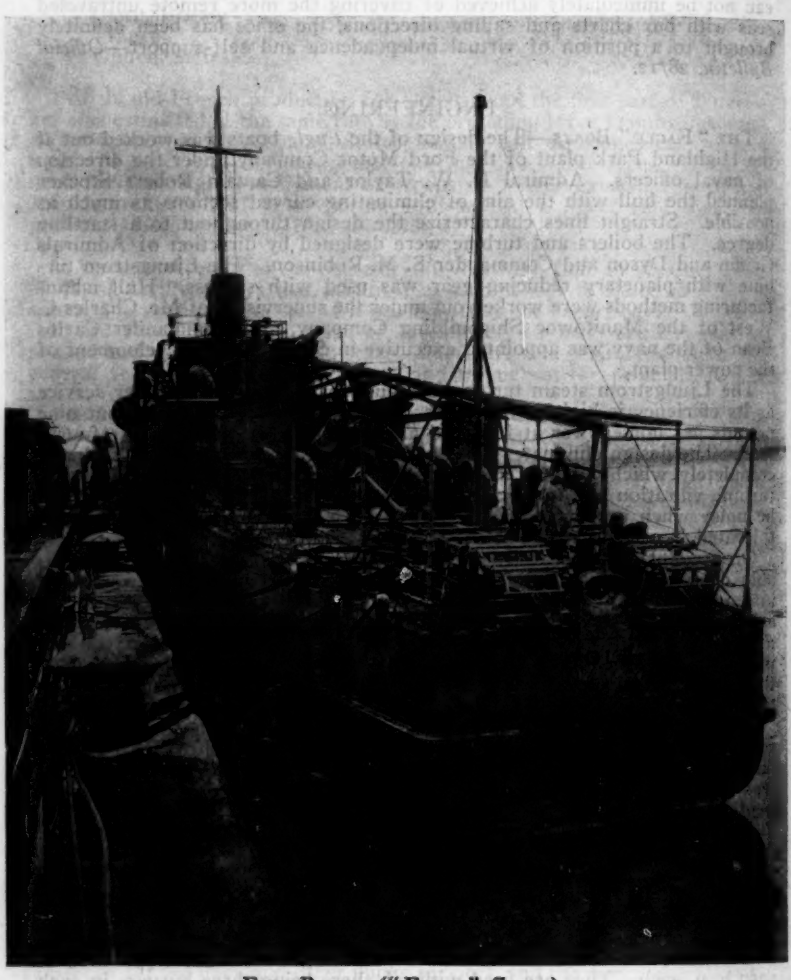
The Ljungstrom steam turbine is peculiarly suited for destroyer service as its efficiency is high at full loads; the steam consumption is about nine pounds per horsepower at full load and only twelve pounds at one-fourth load. The design eliminates noise and vibration in the turbine itself almost completely, which is highly important. The reducing gear tends to magnify turbine vibration and noise and if these are absent the gear alone will not be noisy when properly cut and mounted. Noise and vibration cannot be tolerated in a naval vessel of the destroyer class.

On account of the scarcity of special ship steel shapes and the unavoidable delay in getting them, flanged plates and structural angles were used instead. The flanged plates could be rapidly fabricated from plate stock, and while the distribution of metal and consequent physical properties are inferior to those of regular rolled shapes the difference is not of serious importance. Flanged plates have the advantage over rolled shapes that they can be made to any dimension required and choice is not limited to the regular mill patterns.

The strakes, angles, frames and gussets were drawn up and the positions of all rivet holes were laid out. No detail was omitted that would hamper manufacturing if left to be laid out in the shop. A pattern boat was built in the Highland Park plant and after some changes had been made it was taken apart and each piece marked with its symbol which defined its place and identified it with the drawing. While the planning, drafting, building of the model and its dissection were under way, the new organization that had been formed at the plant on the River Rouge near Detroit, had already begun to manufacture hulls.

Power Plant of the Eagle.—The turbines and boilers were built at Highland Park and the auxiliaries were purchased from the makers. The boilers, two in number, are of the Stirling water tube type, rated at 1250 h. p. each. They are fired with oil, there being three burners in each furnace. The turbine runs at 5000 r. p. m. and develops 2500 h. p. with saturated steam at 350 pounds pressure. Brake tests showed it to have a power exactly 40 per cent in excess of its rating, or 3500 h. p. The shaft bearings are of the floating type and the speed is reduced by a 10 to 1 ratio planetary gear between the turbine and the propeller shaft, the propeller running at 500 r. p. m. The official speed test developed 19½ knots but 21 to 22 knots were made unofficially.

Although the *Eagles* are small, high-power boats in which every cubic inch of space is at a premium, the equipment and appointments are as complete in their way as those of a battleship or cruiser. Provision is made for using either fresh or salt water, which means duplication of pipe systems and auxiliaries. An idea of the amount of piping crowded into them may be gained from the statement that there are 37 distinct pipe systems.



FORD BOAT. ("EAGLE" CLASS).

The installations of this maze of pipes is difficult in a large vessel and is doubly so in the limited space available here. The thin brass voice tubes three inches in diameter have to be made in many sections and bent to follow a most devious course to connect the stations. Every valve, cock, pump, door, ladder and apparatus is marked with a brass name plate. This seemingly small detail is by no means insignificant in the total, as there are over 3600 nameplates in all.

Seven cabins and the quarters provide for officers and crew of 67. The captain's cabin, though small, has a toilet, clothes locker and complete equipment. Appointments were designed to promote the comfort and health of the men, in marked contrast to the British destroyers which provide only the absolute necessities.

A FORD "EAGLE."

BUILDING AND LAUNCHING SHIPS ON WHEELS.

The armament consists of two 4-inch and one 3-inch rapid fire guns, a Y-gun for firing "ash cans" or depth bombs and depth bomb droppers.

Note: The official speed test developed 18.32 knots. Article from Ford Methods in *Ship Manufacture*, by Fred E. Rogers on Industrial Management for January. Illustrations from other sources.

BIG U. S. WARSHIPS TO LEAD WORLD'S.—*Secretary Daniels Tells House Committee of Electrically Driven Craft—New Mexico Speedy.*—America's capital fighting ships of the future will be superior to those of other nations because of their electrically driven machinery, Secretary Daniels told the House Naval Committee to-day in disclosing remarkable results attained by the new dreadnought *New Mexico,* equipped with the electric drive which is to be a feature of all the big ships authorized since 1916.

The *New Mexico's* turbo-electric machinery was designed to develop 26,500 horsepower at full speed and to give the ship a speed of 21 knots.

"She actually developed more than 31,000 horsepower," Mr Daniels said, "and maintained for 4 hours a speed of 21¼ knots, and this when running at a displacement 1000 tons greater than her design called for.

"If she had been tried at her designed displacement, as is customary with all new ships, she would have made 21.5 knots without any trouble whatever; and, what is still better, she could have kept up this speed as long as her fuel lasted, for, like all our later dreadnoughts, she is an oil burner and there would be no reduction in speed due to the necessity of clearing fires, which must be done in coal-burning ships after a run of four hours at top speed."

The Secretary said fuel economy at cruising speed had been one of the things sought in substituting electric drive for the ordinary turbine equipment.

"And I am happy to say," he added, "that this requirement also was met. As a matter of fact, the *New Mexico* will steam at 10 knots on about 25 per cent less fuel than the best turbine driven ship that preceded her.

"On the whole, I think the country has cause to be proud of this achievement in engineering, not alone because of the pronounced success in this particular instance, but because of the assurance it gives of the superiority of our capital ships to those of foreign nations."

The advantages of electrical propulsion as applied to battleships are, the official said:

1. A quick shift by merely turning a switch from cruising speed of 12 knots an hour to high speed of 21 knots an hour.
2. Economy in fuel.
3. The practicability of running a ship astern with exactly the same speed.
4. Saving of space in the engine room.
5. Making it possible to place different units in watertight compartments so that a torpedo explosion disabling one part of the machinery would not cripple the ship.

Members of the Naval Affairs Committee were enthusiastic over the proved practicability and efficiency of electrical propulsion. Secretary Daniels testified that it was much cheaper to equip a vessel with electrical driving machinery than with turbine engines.—*N. Y. Times.*

THE MARINE OIL ENGINE IN THE UNITED STATES.—The types of engines being fitted include semi-Diesel engines, both two and four-cycle, direct reversing and with reverse gears, Diesel engines, two and four-cycle, land trunk piston and marine crosshead designs, engines of high speed of revolution with mechanical gearing, or electrical reduction between the engine and the propeller, and the usual slow-speed direct-coupled motors. The powers up to which the marine oil engine is being built at present in America are relatively small, 200 h. p. per cylinder being the maximum of which we have record. The many and varied types of machinery, however, which are now at sea in the American marine, or shortly will be tried out, will give to the American marine engineers a very clear insight into the problems associated with the future developments of this industry, and will provide much useful data on which to base future designs.—*Engineering,* 29/11.

AERONAUTICS

NAVY DIRIGIBLE HAS FLIGHT.—Manned by aviation officers of the marine corps and the navy, and with two civilian mechanics aboard, the first of the navy's twin-motor dirigibles flew over Washington, October 22, at the completion of the first lap of approximately 315 miles of a flight from Akron, Ohio, to Rockaway, N. Y.

The big dirigible landed at the Anacostia aviation field for a fresh supply of fuel, but resumed its flight at 1.17 p. m. The start was made from Akron, October 22, at 1.10 a. m., central time, and the landing was made at 11.10, eastern time, a running time of nine hours, approximately 35 miles an hour.—*Naval Monthly*, 18/12.

OUR WAR IN THE AIR.—When hostilities were suspended American aviators had destroyed 661 more German airplanes and 35 more German balloons than the Americans had lost. The number of enemy airplanes destroyed by the Americans was 926, and the number of balloons 73, continues a recent Associated Press dispatch. Two hundred and sixty-five American airplanes and 38 balloons were destroyed by the enemy. On November 11, the day of the signing of the armistice, there were actually engaged on the front 740 American airplanes, 744 pilots, 457 observers, and 23 aerial gunners. Of the machines, 329 were of the pursuit type, 296 were for observation and 115 were bombers. Between September 12 and November 11 the air forces operating with the First Army dropped about 120 tons of high explosive on the enemy lines and supply depots and railheads. Figures concerning America's share on other parts of the front have not yet been divulged.—*Scientific American*, 28/12.

ITALIAN "WHITE EAGLE" FOR OCEAN FLIGHT.—The correspondent of *The Daily Telegraph* at Milan reports that Signor Caproni has nearly finished the gigantic machine in which it is intended to fly from Italy to America. The machine is a huge triplane with engines of 3000 horse power and ample accommodation for a certain number of passengers, for whom cabins and sleeping berths will be available.

It is proposed that the aviators take the same route as Columbus did, flying from Italy to Cadiz and the Azores and thence to the American coast and landing near Washington.—*N. Y. Times*, 11/1.

OUR ARMY OF FLIERS.—In his recent annual report Major General William L. Kenley, director of military aeronautics, states that 4980 men had been graduated as reserve military aviators, the first rating for pilots, by June 30, last, with 110 bombers, 85 bombing pilots, 464 observers, 389 observer pilots, and 131 pursuit pilots. In the year ended last June 30 there were 152 fatalities in training, or an average of one death to 2684 hours and 201,000 miles flown. Stalled engines, usually due to an error of the pilot, caused 86 deaths; collisions, 30; and sideslips, 10. The report goes on further to state that 440 balloon officers also had been graduated, 155 of whom were fully qualified observers during the year.—*Scientific American*, 28/12.

AN AIRPLANE BUILT TO BE SHOT DOWN.—Until quite recently, the usual way for a machine gunner to train for his pleasant task of bringing down Boche airplanes has been to blaze away at captive balloons. At best, this has been tame sport. Another way has been to use the so-called camera gun, which records the "hits" on a film or plate; but the main objection to this procedure is that a substitute is used for the gun, and that the "hits" cannot be determined until the negative is developed some time later. It has remained for an American aircraft builder to introduce a diminutive airplane which flies itself without the aid of any human hand to guide it, and which can therefore be used as a target, thus bringing realism and efficiency to the aerial gunnery schools.

The target airplane is of the Burgess-Dunne type, modified to meet the conditions for which it was designed. Inherent stability is obtained by employing a large sweepback and negative dihedral angle. The course of the machine is governed by setting and locking the control surfaces in position prior to flight. The duration of flight may be governed by limiting the fuel supply or by employing an automatic timing device to control the throttle. By the proper setting of the controls, the machine can be made to fly in a spiral path until its fuel is exhausted, whereupon it will assume its natural gliding angle and land approximately at its starting point. This fact makes it an easy matter to recover the machine after a flight, if it has not been shot down before exhausting its fuel.

The little machine is of the seaplane design, to facilitate starting and alighting. It has a span of 18 feet 5 inches. The cord is only 28 inches. The length is 9 feet, while the overall height is 4 feet 8 inches. Although the weight of the complete machine is only 175 pounds, it is capable of carrying a man. The power plant consists of a 12 horsepower, four cylinder motorcycle engine, which has been rebuilt to meet the special requirements. The engine drives a 42-inch propeller, since the machine is of the "pusher" category. While climbing, the diminutive airplane develops a speed of 40 miles per hour, which rises to 50 when flying on a level keel.

Firing at the target airplane, the aerial-gunnery students get excellent practice. They use actual machine guns firing actual cartridges, and operate under conditions pretty close to actual aerial combat. It is not to be supposed that the target airplane is shot down on its initial flight; in fact, its life is considerable because of the difficulty of scoring a vital hit. Most shots merely perforate the wings or clip the structural members, and a few minutes' overhauling soon prepares the target machine for further flights.—*Scientific American* 28/12.

MISCELLANEOUS NOTES

HUNTING WILD FOWL IN PLANES FORBIDDEN BY AERO DIRECTOR.—The Director of Military Aeronautics has ruled against the shooting of wild fowl with machine guns from airplanes.

The shooting of wild fowl with machine guns from airplanes is absolutely forbidden. Airplanes will not be used in any manner for hunting or shooting wild fowl. Airplane flights along the coast, or any place where migratory wild fowl may be found, will be conducted in such a manner as to interfere as little as possible with the habits and feeding of the wild fowl.

Commanding officers will use every means to carry out the regulations and will bring to trial any offenders that may in the future be guilty of breaking any of them.—*Official Bulletin*, 10/1

NAVAL UNIFORMS AT COST.—*Senate Passes House Bill for Equipping Officers.*—The Senate yesterday passed the House bill authorizing the government to furnish uniforms and equipment to naval officers at cost.

Another House bill providing for the temporary promotion of officers of the marine corps now serving with the army also was approved. Both measures now go to the White House for the President's approval.—*Washington Evening Star*, 16/12.

The U. S. cruiser *Milwaukee*, which went ashore at Eureka, Cal., January 13, 1917, has broken in two, it is reported, and is beyond saving. She was 426 feet in length, with a full load displacement of 10,839 tons, and had a speed of 22.22 knots. She was launched in 1904, and was first commissioned in 1906. Her main battery consisted of fourteen 6-inch guns. The contract price of her hull and machinery was $2,825,000.—*Army and Navy Journal*, 11/1.

CURRENT NAVAL AND PROFESSIONAL PAPERS

UNITED STATES

TIMES CURRENT HISTORY. **January.**—Surrender of the German Fleet, by an eye witness. United States Navy in the War (from *Secretary of the Navy's Report*). Brave Deeds of the Marine Corps (from *Secretary of the Navy's Report*). Total Damage Caused by U-Boats.

THE WORLD'S WORK. **January.**—Germany's Future Military Position (Possible Alliances in the East), by *J. B. W. Gardiner.*

ATLANTIC MONTHLY. **January.**—The Idea of a League of Nations, by the *British League of Free Nations Association.* Freedom of the Seas and Our Merchant Marine (an argument for international control of merchant marine), by *Bernard N. Baker.*

INDUSTRIAL MANAGEMENT. **January.**—Ford Methods in Ship Manufacture, by *Fred E. Rogers.*

NATIONAL GEOGRAPHIC MAGAZINE. **November.**—A New Guide for Shipping (Navassa Light Off Jamaica), by *George W. Putnam.*

NAUTICAL GAZETTE. **January 11, 1919.**—Structural Details of Concrete Ships, by *W. Noble Twelvetrees,* M. I.

SCRIBNER'S MAGAZINE. **January.**—Fighting in France With the Marines, by *Lieut. Newton Jenkins.*

SHIPPING. **December 28, 1918.**—Progress in Turbine Ship Propulsion, by *Frances Hodge Curson.*

SCIENTIFIC AMERICAN. **January 11.**—Curious German Projectiles. **January 18.**—Battleship Strength of the Five Leading Naval Powers.

COLLIER'S WEEKLY. **January 18.**—Flying Down the Coast (with American Naval Forces on the French Coast), by *James B. Connolly.* America's Opportunity—the Far East, by *Edgar Mels.*

FLYING. **January.**—Aerial Transportation, by *Henry Woodhouse.*

COUNTRY LIFE. **January.**—(Navy Number). The Navy and its Job, by *Henry M. Beston.* Navy Paintings, by *Reuterdahl.*

JOURNAL OF CLEVELAND ENGINEERING SOCIETY. **November.**—The Inspector's Standpoint in Munition Production, by John T. Marsh.

GREAT BRITAIN

NINETEENTH CENTURY. **December.**—Gibraltar and Ceuta, by *Gen. Sir Chas. Callwell.* "Perfide Albion" (British Treaties With Sweden), by *Sir Francis Piggott.*

LAND AND WATER. **December 5.**—The Freedom of the Seas, by *Arthur Pollen.* **December 19.**—The Victory of the Fleet, by *Arthur Pollen.* Victors of the Air, by *Boyd Cable.* The Surrender of the Submarine, by *Captain Woodis Rogers.*

UNITED SERVICE MAGAZINE. **December.**—Comparisons in German Strategy, by *Lieut. Col. C. H. Wilson.* The Dutch Convoy and the Right of Visit and Search, by *Hugh L. Bellot, D. C. L.*

ENGINEER. **January 3.**—Four Years of Naval Progress (to be inserted in March *Institute*). Aeronautics, 1914-1918. Shipping in 1918.

ENGINEERING. **January 3.**—Crossing the Atlantic by Air.

DIPLOMATIC NOTES

FROM DECEMBER 20 TO JANUARY 20

PREPARED BY

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OPENING OF THE PEACE CONFERENCE

PRELIMINARY MEETINGS OF SUPREME COUNCIL.—Following his visit to Italy, President Wilson returned to Paris on January 7. The first meeting of the Supreme Council of the Peace Congress, consisting of the Premiers, Foreign Ministers, and other representatives of Great Britain, France, the United States, Italy, and later Japan, met at the Foreign Office in Paris on Monday, January 12, and sessions of this body were continued throughout the week. Questions of rules of procedure, admission of delegates, etc., were considered.

It was agreed that for the present no representative of any government in Russia could be admitted, since such recognition would commit the conference to a decision on the whole Russian question.

Following two sessions on January 15, this joint communiqué was issued, giving the number of delegates allotted to various nations:

"The President of the United States and the Prime Minister and Foreign Ministers of the Allied Powers, assisted by the Japanese Ambassadors in Paris and London, held two meetings to-day. In the course of these meetings the examination of the rules of the conference has been continued and almost completed.

"It was decided that the United States, the British Empire, France, Italy, and Japan should be represented by five delegates apiece. The British Dominions and India, besides, shall be represented as follows: Two delegates respectively for Australia, Canada, South Africa, and India, including the native States, and one delegate for New Zealand.

"Brazil will have three delegates. Belgium, China, Greece, Poland, Portugal, the Czechoslovak Republic, Rumania, and Serbia will have two delegates apiece, Siam one delegate, and Cuba, Guatemala, Haiti, Honduras, Liberia, Nicaragua, and Panama one delegate apiece.

"Montenegro will have one delegate, but the rules concerning the designation of this delegate shall not be fixed until the moment when the political situation in this country shall have been cleared up.

"The meeting adopted the following two general principles:

"One—Each delegation being a unit, the number of delegates forming it shall have no influence upon its status at the conference.

"Two—In the selection of its delegation each nation may avail itself of the panel system. This will enable each State at discretion to entrust its interests to such persons as it may designate.

"The adoption of the panel system will in particular enable the British Empire to admit among its five delegates representatives of the dominions, including Newfoundland, which has no separate representation, and of India."

COMPROMISE ON ADMISSION OF THE PRESS.—The question of rules for the admission of press representatives, involving the whole problem of secret or "open" diplomacy and publicity of discussion, came up in the preliminary sessions of January 16 and 17. The American delegates, according to Secretary Lansing, admitted the necessity of closed doors during preliminary discussion, but favored admission of the press when questions came up for final action, and immediate publication of all agreements reached.

The Council on January 17 issued a long and convincing argument in support of its final decision. This was that preliminary discussions and committee meetings should be held in private. "Representatives of the press shall be admitted to the meetings of the full conference, but upon necessary occasions the deliberations of the conference may be held in camera."

FIRST PLENARY SESSION.—The Peace Conference was formally opened at 3.00 p. m. on Saturday, January 18, in the Salle d'Horloge, now rechristened the Salle de la Paix, of the French Foreign Office. President Poincaré welcomed the delegates. President Wilson and Premier Lloyd George then nominated Premier Clemenceau as permanent chairman. In his speech of acceptance M. Clemenceau stated that the program of the Conference included three main subjects of general order: (1) responsibility of the authors of the war; (2) responsibility for crimes committed during the war; and (3) legislation in regard to international labor. On these three questions all powers represented would be invited to present memoranda. The powers particularly concerned would be invited to present memoranda on various territorial, economic, and financial questions.

The league of nations, he added, would be placed at the head of the order of the day of the next full session. The session was then adjourned.

It appears that few full sessions are likely to be held. It may be remembered that the Congress of Vienna met but once in plenary session and did nothing then. At the Congress of Vienna the four victorious powers made the decisions. In the present conference there is a prospect that the Supreme Council of five powers may play a similar rôle, acting as arbiters of the conflicting claims of small nations.

PEACE AIMS OF FRANCE.—On December 29 Foreign Minister Pichon answered in the Chamber of Deputies certain inquiries as to the peace policies of France, as follows:

"First.—That the government was in accord that the utmost publicity should be given to the Peace Conference.

"Second.—That the French Government had adopted the principle of a League of Nations and was now busy working toward its effective realization.

"Third.—That the government did not desire any annexation, but reserved the right to fix the Alsace-Lorraine frontiers, to guard against future attack.

"Fourth.—That the government did not think that the question of diplomatic representation of the Vatican arose at the present moment.

"Fifth.—That intervention in Russia was inevitable.

"Pichon explained, reading from instructions issued by Premier Clemenceau to the General commanding, that such intervention was not offensive for the time being, but defensive, in order to prevent the Bolsheviki from invading the Ukraine, the Caucasus, and Western Siberia. In the future an offensive intervention might be necessary in order to destroy Bolshevism. Such an operation must be carried out by Russian troops, of which 100,000 were at the present time ready at Odessa."

MARSHAL FOCH WANTS RHINE BARRIER.—In a statement to American newspaper correspondents at Treves on January 17, Marshal Foch advocated barring German military establishments or control of strongholds west of the Rhine; in other words, while France sought no territorial accessions west of the Rhine other than Alsace Lorraine, he advocated making the Rhine a military barrier against future German aggression.

"The Rhine," he said, "is the common barrier of all the Allies; it is the guaranty of peace for all those peoples who have shed their blood for liberty in this war.

"We have no idea of attacking Germany or reopening the war. Democracies such as ours never force an attack. They ask only to live and develop in peace. But who can say that Germany—where democratic ideas are new and perhaps very superficial—will not recover rapidly from her defeat and in a few years attempt a second time to crush us?

"Russia is hors de combat for years. England must cross the channel. America is far away.

"France should be in a position (*en mesure*) to safeguard the general interests of humanity. These meet at the Rhine. It is there that we must plan to prevent surprises, unfortunate for the future."

Marshal Foch declared that his plan linked up with the League of Nations, since it would be the duty of such a league to see that decisions regarding the Rhine provinces were carried out.

AIMS OF GREAT BRITAIN.—An interpreter of the war aims and claims of Great Britain, in an interview of January 17, mentioned her desire for a League of Nations, for a good working agreement with the United States, for peace and facilities of trade and transit in Europe. Regarding freedom of the seas and free trade, he spoke as follows:

"As to the freedom of the seas, Great Britain, it is maintained, will in the future as in the past aim at securing the greatest possible freedom for commerce to all nations in times of peace. This is what she means by the freedom of the seas. The question of the rules of warfare by sea she considers quite separate and as requiring discussion, but she hopes that the causes of the war will be removed.

"Great Britain desires the greatest freedom of trade on land and sea and she expects a League of Nations to guarantee this. Before the war British colonies were open to the world. The British consider that Germany abused the privileges offered and that each German tradesman was a potential spy and Great Britain has no desire to return to this condition of affairs. She wants to rid trade of the political element which Germany injected into it.

"Great Britain does not want to become a protectionist power, but she does not wish free trade to put her at a disadvantage. Unless the Peace Conference eliminates the objectionable features existing before the war, it is probable that Great Britain would be forced to defend herself by special laws."

THE ALLIES IN THE NEAR EAST.—Paris, Jan. 1 (Associated Press).—France plans to assume the guidance of the destinies of Armenia, Syria, and Lebanon in the new order of world affairs, in conformity with treaties signed with Great Britain and Russia in 1915, if the Peace Conference does not rule otherwise, according to authoritative information furnished the Associated Press.

Palestine, according to the plan under consideration, would, with its complexity of nationalities and religions, be placed under international protection. England would be responsible for the Arabian peninsula, with the exception of the Kingdom of Hedjaz, which would be free.

France, it is emphatically stated, eschews the term "protectorate" in connection with her proposed supervision of these countries, and it is probable that some such relation with them as exists between England and her Dominions would be established.

These facts were given as an explanation of the declaration of Stephen Pichon, Foreign Minister, in the Chamber of Deputies Sunday. Referring to the manner in which France would deal with Asia Minor and nationalities formerly ruled by Turkey, M. Pichon said:

"We have nothing but friendly feelings for the Turks, and we have testified to them in protecting subjugated nations in the Ottoman Empire over which we have century-old rights. . . . Our rights are incontestable in Armenia, Syria, Lebanon, and Palestine. They are based on historic conventions and on more recent contracts. While admitting the entire liberty of the Peace Conference to deal with the subject, we consider our rights are fully established by our agreements with Great Britain."

THE LEAGUE OF NATIONS

ESSENTIAL AGREEMENT ANTICIPATED.—Among the 40 or more plans of a League of Nations submitted to the Peace Conference, no definite choice was made, or at least no official announcement issued by the American or other delegates, prior to the opening of formal sessions of the Conference. Press reports, however, indicated that essential agreement had been reached on this point between President Wilson and British leaders during the President's visit to England, and that the President was willing to accept British views regarding freedom of the seas.

It was further reported on January 16 that as a result of recent conferences between Lord Robert Cecil, Secretary Lansing, and Col. House, a covenant had already been drawn up embracing 13 articles and eight supplementary provisions, which brought together the main features of all plans presented.

The American delegation, it was said, would urge that whatever project was adopted should be included in the peace treaty, and that the League of Nations should be one of the first topics considered at the plenary conference.

THE FRENCH PLAN.—On December 21, M. Leon Bourgeois and Baron d'Estournelles de Constant presented to Premier Clemenceau the plan for a League of Nations formulated by the French association for promoting such a league. This plan, as summarized in the *New York Nation*, included the following points:

1. Compulsory arbitration without limitation or any exception of questions involving national honor or dignity. 2. Limitation of armaments. 3. The establishment of a council of administration of the nations for

the formulation of new international administration and international legal procedure. 4. The application of diplomatic, judicial, economic, and, as a final resort, military sanctions to enforce upon recalcitrant nations the decisions of the league. In explaining the plan Baron d' Estournelles de Constant is reported as saying: "There will be different views concerning the military enforcement of peace. Our aim is to reconcile these differences and secure some workable basis of agreement."

THE "AMERICAN PLAN."—An Associated Press dispatch from Paris dated January 7 gave the following suggestions as to the plan favored by the American representatives:

The American point of view, as it is now being formulated by the specialists, seeks to reach an accord on fundamentals on which all agree and present them in simple working form. One of the chief of these fundamentals is the formation of a league which will embrace all the nations of the world, but not one which will establish any balance of power among the group of nations.

Also, care is being taken that the influence of the various nations in the league shall be in accordance with their size and importance, so that the great powers and the small will have voices according to their standing.

Another feature especially concerning small, undeveloped nations, is to be established, according to the American plan—a system of international trusteeship whereby the various larger nations, having a developed and stable civilization, will act as trustees for the Society of Nations in fostering the progress and development of undeveloped communities.

It is recognized that the League of Nations will have to have some established and permanent seat for its extensive international work, and the gradual conviction is taking form that this seat will be Versailles.

CLEMENCEAU FAVORS BALANCE OF POWER

No franker or more authoritative indication can be found not only of the conciliatory attitude of the allied nations, but also of their divergences of opinion, than in the remarks of Premier Clemenceau to the Chamber of Deputies on the night of December 29.

The Chamber afterward supported the Premier by a strong vote of confidence, only the Socialist wing failing to approve his views.

Replying to charges made by Albert Thomas, Socialist leader, that he had kept the Chamber without information, Premier Clemenceau said:

"The question of peace is a tremendous problem. It is a question which is one of the most difficult ever submitted to the nation at any time. In a few days a conference of delegates will meet at Paris which will settle the fate of nations in all parts of the world.

"People say: 'Premier Lloyd George has spoken, President Wilson has spoken, but you have said nothing.' I have given explanations whenever you have asked me. But it isn't because Mr. Lloyd George has spoken, or because Mr. Wilson has arrived from America with elevated thoughts that I am obliged to explain myself and keep running to the Speaker's rostrum.

"France was in an especially difficult situation. It was the country nearest Germany. America was far away and took her time to come into the war. England came at once at the call of Mr. Asquith. We suffered and fought; our men were mowed down and our towns and villages were destroyed.

"There is an old system of alliances called the 'balance of power.' It seems to be condemned nowadays, but if such a balance had preceded the war; if England, the United States, France, and Italy had agreed;

say, that whoever attacked one of them attacked the whole world, the war would not have occurred. This system of alliances, which I do not renounce, will be my guiding thought at the Peace Conference if your confidence sends me there.

"I have been reproached with deceiving President Wilson. I do not understand why. I have made it a rule not to question him, but to let him develop his views. That is what he did. President Wilson, to whom certain persons, in the interest of their parties, attribute intentions which, perhaps, are not his, has opened his mind and has inspired respect through his simple speech and the nobility of it. President Wilson said to me: 'I will try to convince you, but perhaps you will convince me.'

"You know that reservations have been made on the question of freedom of the seas. Premier Lloyd George said to me one day: 'You will admit that without the British fleet you could not have continued the war.' I answered in the affirmative. The British Premier then asked me if I was disposed to do anything in opposition to British ideas on the freedom of the seas. I answered in the negative. Concerning this question, President Wilson said to me:

"'I approve of what you said. What I have to offer the allied governments will change in no way your answer to Premier Lloyd George.'"—*N. Y. Times*, 31/12.

AMERICA WILL JOIN WITH ALL OR NONE.—At Manchester, the stronghold of British liberalism, on December 30, at almost the same time as M. Clemenceau's speech in favor of a permanent league of the Allies, President Wilson declared that the United States "will join no combination of power which is not a combination of all." There follows the part of this speech which refers to a League of Nations:

"And so it does seem to me that the theme that we must have in our minds now in this great day of settlement is the theme of common interest and the determination of what it is that is our common interest. You know that heretofore the world has been governed, or at any rate the attempt has been made to govern it, by partnerships of interest, and that they have broken down. Interest does not bind men together. Interest separates men. For, the moment there is the slightest departure from the nice adjustment of interests, then jealousies begin to spring up. There is only one thing that can bind peoples together, and that is common devotion to right.

"Ever since the history of liberty began men have talked about their rights, and it has taken several hundred years to make them perceive that the principal condition of right is duty, and that unless a man performs his full duty he is entitled to no right. It is a fine co-relation of the influence of duty that right is the equipoise and balance of society.

"And so, when we analyze the present situation and the future that we now have to mold and control, it seems to me there is no other thought than that that can guide us. You know that the United States has always felt from the very beginning of her history that she must keep herself separate from any kind of connection with European politics. I want to say very frankly to you that she is not now interested in European politics, but she is interested in the partnership of right between America and Europe. If the future had nothing for us but a new attempt to keep the world at a right poise by a balance of power the United States would take no interest, because she will join no combination of power which is not a combination of all of us. She is not interested merely in the peace of Europe, but in the peace of the world.

"Therefore it seems to me that in the settlement which is just ahead of us something more delicate and difficult than was ever attempted before has to be accomplished—a genuine concert of mind and of purpose.

But, while it is difficult, there is an element present that makes it easy. Never before in the history of the world, I believe, has there been such a keen international consciousness as there is now.

"There is a great voice of humanity abroad in the world just now which he who cannot hear is deaf. There is a great compulsion of the common conscience now in existence which if any statesman resist, will gain for him the most unenviable eminence in history. We are not obeying the mandate of parties or of politics. We are obeying the mandate of humanity.

"That is the reason why it seems to me that the things that are most often in our minds are the least significant. I am not hopeful that the individual items of the settlement which we are about to attempt will be altogether satisfactory. One has only to apply his mind to any one of the questions of boundary and of altered sovereignty and of racial aspirations to do something more than conjecture that there is no man and no body of men who know just how they ought to be settled; and yet if we are to make unsatisfactory settlements we must see to it that they are rendered more and more satisfactory by the subsequent adjustments which are made possible. We must provide the machinery for readjustments in order that we have the machinery of good-will and friendship.

"Friendship must have a machinery. If I cannot correspond with you, if I cannot learn your minds, if I cannot co-operate with you, I cannot be your friend; and if the world is to remain a body of friends, it must have the means of friendship, the means of constant friendly intercourse, the means for constant watchfulness over the common interests.

"That makes it necessary to make some great effort to have with one another an easy and constant method of conference, so that troubles may be taken when they are little and not allowed to grow until they are big. I never thought I had a big difference with a man that I did not find when I came into conference with him that, after all, it was rather a little difference, and that if we were frank with one another and did not too much stand upon that great enemy of mankind which is called pride, we could come together.

"It is the wish to come together that is more than half of the process. It is a doctrine which ought to be easy of comprehension in a great commercial centre like this. You cannot trade with a man who suspects you. You cannot establish commercial and industrial relations with those who do not trust you. Good-will is the forerunner of trade. Good-will is the foundation of trade, and trade is the great amicable instrument of the world on that account."

ARMISTICE EXTENDED ONE MONTH

Paris, Jan. 17.—The German armistice has been extended one month by the Commissioners, who have concluded their session at Treves.

The clauses offered by the Allies concerning agricultural implements, Russian prisoners of war, naval conditions, and the restitution of material stolen by the Germans from invaded countries were signed by the enemy delegates.

The Havas Agency announces the signature of the new clauses of the armistice as they stood concerning the surrender of German submarines ready for sea and the destruction of the submarines in course of construction which the allied Commissioners discovered in German ports in December. The clause placing the German merchant fleet at the disposal of the Allies also was signed. Under the terms of the prolongation of the armistice Germany must deliver by February 17 some 58,000 agricultural machines of various kinds.—*N. Y. Times*, 18/1.

In the extended armistice it was provided that Germany should turn over her shipping in neutral and German ports for the use of the Allies,

the ships to be allotted among the Allies according to their needs. Remuneration for this shipping would be applied in payment of foodstuffs to be sent to Germany, which included 70,000 tons of pork and 200,000 tons of cereals.

GREAT BRITAIN

ELECTION A TRIUMPH FOR LLOYD GEORGE.—The complete returns of the Parliamentary elections in the United Kingdom were announced on December 29. They showed an increased majority for the coalition government of Premier Lloyd George. The figures follow:

Coalition

Coalition Unionists	334
Coalition Liberals	127
Coalition Labor	10
Total coalitionists	471

Other Parties

Unionists	46
Asquith Liberals	37
Labor	65
National Party	2
Socialist	1
Irish Nationalists	7
Sinn Feiners	73
Independents	5
Total of other parties	236
Coalition majority	235
Coalition majority with 46 Unionists	327
Grand total	707

The chief surprises of the election were the almost complete success of the Sinn Feiners and the falling off of the Labor vote. The government majority will be increased by the refusal of the Sinn Feiners to take seats in the British House of Commons. While the elections indicate that Great Britain has turned away from labor, socialism and pacifism, it should be remembered that only about 50 per cent of the registered voters appeared at the polls.

CABINET CHANGES.—In the new Cabinet announced by Premier Lloyd George on January 10 the majority consists of Conservatives. Some of the more important appointments follow:

Lord Privy Seal and Leader in the House of Commons—Andrew Bonar Law.
President of the Council and Leader in the House of Lords—Earl Curzon of Kedleston.
Ministers Without Portfolio—George Nicoll Barnes and Sir Eric Geddes.
Foreign Secretary—Arthur J. Balfour.
Secretary for the Colonies—Viscount Milner.
Secretary of War and the Air Ministry—Winston Spencer Churchill.
First Lord of the Admiralty—Walter Hume Long.

Sir Eric Geddes, appointed Minister Without Portfolio, will undertake the management of demobilization; and Mr. Barnes, also without portfolio, will represent Labor at the Peace Conference.

The Cabinet is regarded as temporary in character, and likely to be altered following the Peace Conference and upon the resumption of home policies.

PLANS OF THE SINN FEINERS.—Following their election of 73 out of 80 Irish members of parliament, the Sinn Feiners declared their intention to refrain from taking seats in the House of Commons and to meet instead in Dublin as an Irish National Assembly. The plans for the Assembly were delayed by the fact that 34 of those elected were still in jail, though it was rumored that the government would soon release them. The *London Globe* published on January 9 a draft of what purported to be a Sinn Fein constitution for Ireland, making the country an independent republic. January 21 was set as the date for the Dublin Assembly.

SHIFT OF GIBRALTAR DISCUSSED.—Paris, Dec. 26.—The cession of Spanish Morocco to France in exchange for a cash consideration of 1,000,000,000 francs, the return of Gibraltar to Spain by Great Britain and the abandonment of Ceuta, Morocco, to Great Britain by Spain are being openly discussed. It is asserted that the Spanish Premier, Count Romanones, recently, during his visit to Paris, made such a proposal to President Wilson and M. Clemenceau, the French Premier. While officials have declined either to confirm or deny this report, the question was freely discussed in the corridors of the Chamber of Deputies this afternoon.

There also has been a renewal of the talk of building a tunnel across the Strait of Gibraltar and making a direct all-land connection between Africa and France which might be extended to England if the English Channel were tunneled.—*N. Y. Times,* 28/12.

DISPOSITION OF GERMAN COLONIES.—Special Cable to *The New York Times.*—Paris, Dec. 23.—In the course of a conversation on peace conference problems a French statesman surprised me to-day by saying that France was not particularly interested in the question of the German colonies.

"That is a matter," he said, "which the French consider as exclusively British, and we are prepared to agree unquestioningly to any conclusion Great Britain reaches."

I asked him if he meant that literally to the extent of agreeing to the restoration of part of the colonies, should England so decide.

"Yes, we would agree to anything," he replied, "but there is no danger of the British consenting to their restoration.

"There are three sufficient reasons for not restoring the colonies.

"The first concerns the naval activity of future wars. There is no question in French opinion that the submarine will be the chief naval machine of the future. It is true that after peace is signed and we get to a second congress for such matters as a League of Nations, we shall try to formulate some rule to prohibit submarine atrocities in future wars; but nevertheless it will not be forgotten that we have to deal with Germany and have to watch her submarine activities. For that reason England cannot afford to let Germany have colonies which would serve as building places and bases for powerful submarine fleets.

"Second, it is greatly to be feared that Germany would in future use her colonies as places in which to raise, train, and equip vast black armies to be transported to Europe.

"Third, there are the political relations between England and her African possessions. They constitute a great factor in the German colony problem. The German colonies were conquered not by the English, but by British colonial troops, largely from South Africa, where there is a mixed English and Dutch population. These English colonies will not tolerate the restoration of the German colonies and the consequent menace to themselves. So Great Britain now has a chance, by letting Cape Colony keep what it has won, to build up in that colony the same loyalty and devotion to the Crown that exists in Canada and Australia."

JAPAN WOULD RETAIN PACIFIC ISLANDS.—In a statement of November 18 regarding Japan's attitude in the Peace Conference, Premier Okuma declared that in general Japan should approve all decisions reached by her allies. Regarding problems in the Pacific, he is reported as follows:

"The future of the Samoan Islands, which has caused various diplomatic controversies between Great Britain, the United States, and Germany, should be decided in accordance with the will of the former two powers for the purpose of destroying German bases in the Pacific.

"The German New Guinea, which is now occupied by the British, should not be returned to Germany. The principle should also be applicable to the Bismarck Islands.

"Japan should hold islands like the Marshall, Caroline, and others, which are now occupied by the Japanese Navy, as it is dangerous to return them to Germany, and as there is no reason to let other powers occupy them.

"The cable line between Tsingtao and the Southern Islands, which is now occupied by the Japanese Navy, should be held by Japan. The cable line is a property owned by a private concern, so that Germany should buy it up before conceding it to Japan.

"The problems relating to the maintenance of order in Siberia should be settled by the allied conference, but all the allied powers should refrain from any action or demand for acquiring concessions in Siberia.

"The relations between China and other powers should be based upon the principle of open-door and equal opportunity."—*N. Y. Times*, 19/11.

GERMANY

SOVIETS VOTE POWER TO EBERT CABINET.—Before its dissolution in the third week of December, the Congress of German Soldiers' and Workmen's Councils voted to transfer legislative and executive power to the People's Commissioners (the six members of the Ebert Cabinet). The Congress also elected a permanent Soviet Advisory Council of 27 majority Socialists, and voted down a resolution to exclude bourgeois parties from participation in elections to a National Assembly.

THE CHRISTMAS REVOLT IN BERLIN.—Serious disturbances were renewed in Berlin during Christmas week, the immediate cause being an order of City Commandant Wels that the pay of marine divisions from Kiel should be withheld unless they disbanded or left Berlin. Sailors and marines on the night of December 23-24 seized the royal palace and stables, and made attacks on other government buildings. The forces of Police President Eichhorn, afterward dismissed as an adherent of the Sparticides, supported the mutineers. After considerable bloodshed, a compromise was effected with the government in control.

INDEPENDENTS QUIT CABINET.—When on December 28 the Central Soviet Council of Twenty-Seven approved the action of Ebert, Scheidemann, and Landsberg in employing force to put down insurrection, the three Independent Socialists of the Cabinet—Haase, Barth, and Dittmann—resigned. They stated, however, that their action did not signify approval of the violent Sparticide tactics. Three Majority Socialists, Noske, Loebe, and Wissel, were appointed in their stead. Herr Noske, formerly Military Governor at Kiel, undertook control of the government military forces in Berlin.

SPARTICIDE REVOLT SUPPRESSED.—With the evident policy of breaking up the Ebert government and preventing the convocation of a National Assembly, the Sparticide or Liebknecht faction in Berlin carried on violent disturbances throughout the week of January 6-12. Eichhorn, the deposed Sparticide police chief, refused to turn over his office, and his headquarters became a center of the revolutionary movement. During these days immense crowds thronged the streets of Berlin, rioters fired on government troops and attacked public buildings, and bloody struggles ensued for possession of the strongholds of each side. The Sparticides for a time held the War Office, Police Headquarters, several railway stations, and the chief newspaper offices. On January 11 government troops forced the surrender of the Vorwaerts Building after it had been in the hands of the Sparticides for almost a week. Some 400 of its defenders were taken prisoners. On January 15 the revolution apparently was completely suppressed. Dr. Karl Liebknecht on that date was shot by soldiers while attempting to escape from custody; and the woman agitator, Rosa Luxemburg, was beaten and shot to death by a mob. Estimates placed the number of rioters killed at over 1000. The total number killed on both sides in street fighting was far greater.

PEACE CONFERENCE CONSIDERS LIFTING BLOCKADE.—In view of the Bolshevistic agitation in Germany and the necessity of military occupation of the entire country if the Ebert government were overthrown, the allied delegates at the Peace Conference took under consideration a partial lifting of the blockade and the sending of food to Germany. This was provided for in the renewal of the armistice referred to elsewhere. In response to an urgent message from President Wilson, the United States Congress appropriated $100,000,000 for immediate relief measures in Europe.

NEW CONSTITUTION DRAFTED.—Berlin, Jan. 15 (via Copenhagen).—The Ebert Government has prepared a draft of a new constitution which will be submitted to the National Convention soon after it assembles, probably on February 10.

The draft provides that the President shall be elected for ten years by direct vote of the whole people. He may be re-elected.

The union of States yet to be formed will be on the American principle, Statehood being accorded to any population over 2,000,000. It is planned to divide Prussia into eight separate Slates.—*N. Y. Times*, 17/1.

ELECTIONS FOR NATIONAL ASSEMBLY.—While civil war was raging in Berlin, election campaigns were proceeding throughout Germany for the choice of delegates to the National Assembly. Elections already held indicated overwhelming popular support for the more conservative parties.

Elections were held in Berlin on Sunday, January 19. Foreign Secretary Scheidemann at that time announced that the Assembly would be convoked on February 16.

LUXEMBOURG DUCHESS DEPOSED.—An opera bouffe revolution occurred in Luxembourg in the middle of January, when the Grand Duchess Marie Adelaide abdicated and her younger sister, Princess Charlotte, succeeded.

While the opposition to the Grand Duchess aimed at a republic, Premier Alweiss succeeded in limiting the change to a shift of rulers. The new régime is, however, more acceptable to the Allies, since the Grand Duchess Marie Adelaide was said to be reconciled to German occupation of her territory.

ITALY

ITALY SPLIT OVER PEACE CLAIMS.—At the close of December Minister of Pensions Leonida Bissolati resigned from the Orlando Cabinet, giving as his reasons his failure to induce Foreign Minister Sonnino to compromise with the Jugoslavs.

"I have failed," he said, "to move Baron Sonnino away from these three clauses of the secret treaty of London: (1) Annexation of a large portion of Dalmatia from Hissariki and Trebuije to Cape Planpa (Article 5); (2) Permanent retention of all the 13 islands of so-called Dodecannese with their almost exclusively Greek population (Article 8), and (3) Inclusion within Italian territory of the German population of the Northern Tyrol as far as the Brenner (Article 4). Baron Sonnino insists on the absolute intangibility of the secret treaty of London."

While war was still going on, the moderate attitude of Bissolati received strong popular support, especially from the Socialists; but victory strengthened the hand of the Annexationists. The position of the latter is stated in the following extracts from a letter issued by Captain Tozzi and Lieut. Pecorini, members of the Italian Mission to the United States:

"No matter how much Italy and the other Allies may desire the union and prosperity of future Jugoslavia, the present status of the Slovenes, Croatians, Bosnians, and Herzegovinians is the same as that of the Prussians; they are defeated enemies. England believes that a truly repentant Prussia is necessary in order to have peace in the North Sea; Italy believes that a truly repentant Slavonia and Croatia are necessary in order to have peace in the Adriatic.

"The terms of the present armistice are the terms of the Allies and not only of Italy.

"Even not considering historical, cultural, and strategic rights, Italy possesses to-day enough military and naval strength to obtain and maintain for a long time to come the settlement which she considers necessary for her security. Besides the strength she has a treaty which, secret or not, desirable or otherwise, has no more and no less validity than all other similar treaties and understandings between the Allies, and constitutes an integral part of a general situation, involving not only the interests and the policy of Italy, but the interests and the policy of England and France as well.

"The Jugoslavs of the former Austrian Empire have furnished all through the war and to the very last battle the divisions that fought with most bitterness against the Allies on the Italian front; all Italian soldiers confirm this fact.

"Before pleading, as they now do, for a united Jugoslavia outside of Hapsburg influence, a very large number of Slovenes and Croats agitated and intrigued for months to constitute a Jugoslav State federated with Austria, and have only unwillingly come to their present position.

"These facts, which unfortunately Italian liberals are not able to deny, have been strengthening more and more the position of the conservatives, who are unwilling to take any chances with the Jugoslavs, and insist on absolute guarantees.—*N. Y. Times*, 8/1.

ORLANDO CABINET REORGANIZED.—On January 13, Premier Orlando was recalled from Paris by the resignation of Finance Minister Nitti and other members of his cabinet. Nitti is leader of the Catholic party in Italy, which has recently been greatly strengthened by fears of Bolshevism and a consequent withdrawal from Socialistic parties. His action was therefore regarded as a move to secure control of the government. Premier Orlando, however, succeeded in reforming his Ministry, and on January 16 announced a new slate, with Baron Sonnino still in charge of foreign affairs.

PRESIDENT WILSON IN ITALY.—During President Wilson's visit to Italy in the first week of January, he gave no indication, other than might be drawn from his general principles, of his position regarding Italy's Adriatic claims. His closest approach to the Balkan question is contained in the following extract from his speech to the Italian Chamber of Deputies on January 3:

"The great difficulty among such states as those of the Balkans has been that they were always accessible to secret influence; that they were always being penetrated by intrigue of some sort or another, that north of them lay disturbed populations which were held together not by sympathy and friendship, but by the coercive force of a military power.

"Now the intrigue is checked, and the bonds are broken, and what we are going to provide is a new cement to hold the people together. They have not been accustomed to being independent. They must now be independent.

"I am sure that you recognize the principle as I do—that it is not our privilege to say what sort of a government they should set up. But we are friends of those people, and it is our duty as their friends to see to it that some kind of protection is thrown around them—something supplied which will hold them together.

"There is only one thing that holds nations together, if you exclude force, and that is friendship and good-will. The only thing that binds men together is friendship, and by the same token the only thing that binds nations together is friendship. Therefore our task at Paris is to organize the friendship of the world—to see to it that all the moral forces that make for right and justice and liberty are united and are given a vital organization to which the peoples of the world will readily and gladly respond.

"In other words, our task is no less colossal than this: To set up a new international psychology; to have a new real atmosphere. I am happy to say that, in my dealings with the distinguished gentlemen who lead your nation, and those who lead France and England, I feel that

atmosphere gathering, that desire to do justice, that desire to establish friendliness, that desire to make peace rest upon right; and with this common purpose no obstacles need be formidable."

SOUTHEASTERN EUROPE

CZECHO-SLOVAK REPUBLIC ORGANIZED.—On December 22 Prof. T. G. Masaryk took the oath of office as president of the new Czecho-Slovak state. A temporary National Assembly of 259 members was created, with each party represented according to its estimated strength; and a cabinet of 17 members was formed under Premier Kramarz, including eight Socialists and a Catholic priest as Minister of Railways. The tasks of the new government are stated as follows:

"The drafting of a constitution, the delimitation of Slovak territory withdrawn from Hungary, an agreement with the Poles as to claims in Austrian Silesia, an arrangement as to the debts of the defunct empire, a settlement of the status and rights of the German Bohemians, provision for the Czecho-Slovak troops still in Russia, and an emergency currency."

JUGOSLAV GOVERNMENT AND ASPIRATIONS.—A dispatch from Belgrad dated December 21 announced the formation of a Jugoslav cabinet, with M. Protitch as Premier and M. Trumbitch as Foreign Minister. M. Protitch was formerly Minister of the Interior in the Serbian cabinet, and M. Trumbitch is head of the Jugoslav Committee in Paris. On January 5 representatives of all the Jugoslav states—Serbia, Montenegro, Bosnia, Herzegovina, Dalmatia, Croatia, and Slavonia—met at Belgrad to carry forward the organization of the union. All manifestoes of the Jugoslavs assert their intention to press their territorial claims at the Peace Conference. Thus the Washington headquarters writes on December 25:

"The first thing the delegation will ask will be the full political and territorial recognition of the new State. The territorial claims, based upon the principle of justice and national self-determination, include in the new state all those territories where Jugoslavs live in compact masses and where they have formed since time immemorial an undisputed territorial continuity. These territories are Serbia and Montenegro, Bosnia and Herzegovina, Croatia and Slavonia, Dalmatia, Carniola, Istria and Trieste, Gorizia, parts of Southern Styria, parts of Carinthia, Baoska, and parts of Banat and Megjumurje.

"Except in the Adriatic coast lands there is no dispute about the righteousness of the Jugoslav claims. Trieste and the western part of Istria have a majority of Italians, but Trieste is a component and indivisible part of the whole Jugoslav hinterland, whereas the proportion of the population in the whole of Istria shows 224,000 Jugoslavs as against 145,516 Italians. But Italy claims besides Istria and Trieste the whole of Gorizia and the greater part of Dalmatia, where the Italian population is negligible, being 108,147, as against 767,708 Jugoslavs.

"Between Italian imperialistic and Jugoslav national claims there cannot be any compromise whatever. Only force can impose upon the Jugoslavs acceptance, for the moment, of a decision contrary to their rights. Any unjust settlement would unavoidably result in far-reaching future trouble. The Jugoslav peace delegation will have to make this point clear to the Peace Conference and to induce the Allies and America to arrange a settlement such as will assure not only peace in the Adriatic, but the very necessary good relations between Italy and the Jugoslavs."

That the Jugoslav Union is not yet fully established is suggested by a report on January 16 that a force of some 20,000 Montenegrins had organized to oppose Serbian troops. The so-called Montenegrin National Assembly which met and deposed King Nicholas was declared by the latter to be without popular sanction.

POLAND

PADEREWSKI HEADS NEW GOVERNMENT.—A Warsaw dispatch of January 16 announced that Ignace Paderewski, who as the representative of the Polish National Committee in Paris and with the somewhat more dubious sanction of American Polish organizations in America had for some time been attempting to establish a new national government in Poland, had reached an agreement with General Pilsudski, the military dictator then in control. In accordance with this agreement, a new government had been formed with M. Paderewski as Premier.

In the meantime German forces were organizing to resist Polish troops which had already occupied German Poland and were threatening the frontiers of Silesia and East Prussia. Czechs and Poles were at odds on the southern boundary of Poland. On the north, the advance of Bolshevik forces, following the German evacuation, threatened to interfere with Poland's ambition to extend her northern frontier.

Reports of dubious authenticity suggested that France and other of the western powers might favor a strong Polish state as a protection against Bolshevism, and on the condition that Poland should assume responsibility for a part of the repudiated Russian national debt.

RUSSIA

KOLCHAK DECLARES FOR POPULAR RULE.—An Omsk Associated Press dispatch of January 13 stated that Admiral Kolchak, the dictator at the head of the Omsk Government, had signed a paper proclaiming an All-Russian election of delegates to a Constituent Assembly, the election to be held "at the earliest practical moment." Admiral Kolchak at the same time defended his rule on the ground that he had been merely selected by his colleagues to guide Russia through her crisis, after which he would at once turn the country over to properly constituted civil authorities.

ALLIES UNDECIDED OVER RUSSIAN POLICY.—Aside from the conclusion that representatives of no government in Russia could be admitted to the Peace Conference for the present, the allied nations at the opening of the Conference had reached no definite decision as to their future policy toward Russia.

Early in January Great Britain made tentative proposals to her allies to the effect that all the various governments in Russia be invited to cease hostilities and make peace at home and abroad, following which these governments would be allowed to send delegates and present their claims at Paris.

To this proposal France expressed a vigorous dissent. On January 11, Foreign Minister Pichon issued a statement denouncing the régime of the Bolsheviki and declaring that negotiations with such a government would be counter to the principles which had guided the Allies, and virtually a compact with crime.

JAPAN RECALLS RESERVES.—Reports from Japan on January 9 stated that Japanese forces would be largely withdrawn from Siberia, the first withdrawal to be made in the latter part of February and to affect some 30,000 men.

BOLSHEVISM IN ARGENTINA

On January 10 a general strike was declared in Buenos Ayres and other cities of Argentina, and serious rioting and bloodshed occurred in the capital. General Deluepaine, commanding the government forces, assumed a temporary military dictatorship, ordered troops to fire on rioters, and within three days arrested some 8000 disturbers, thus checking disorder. It was stated that 809 of those arrested were Russians. Subsequent police investigation in Buenos Ayres, and also at Montevidio, Uruguay, showed that the disturbances were in large part the outcome of a Bolshevist movement started by foreign agitators.

REVIEW OF BOOKS

ON

SUBJECTS OF PROFESSIONAL INTEREST

"Naval Machinery." Third Edition. By H. C. Dinger, Commander, U. S. Navy. Price, $3.00. (New York: D. Van Nostrand Company.)

This is the third edition of the "Handbook for the Care and Operation of Naval Machinery," the first edition being published in 1908. This handbook was written "to fill a demand for a concise and simple description of the care and operation of naval machinery on many points not largely touched upon in the standard treatises on Marine Engineering."

In this latest edition new chapters have been added covering burning of fuel oil, warming up of turbines, tolerances, cylinder and piston bore clearances, lubrication, Bureau of Steam Engineering, Flange Tables, and electric steering gears. The chapters on inspections, clothing and lagging, feed heating, evaporators, piping, valves, cleaning and painting, work shop machinery, tools and spare parts, and tests of machinery and piping have been revised to bring them in accordance with the latest practice.

The description of each piece of naval machinery is concise and more thorough than that given in standard text books.

The special value of this handbook lies in what may be called "Wrinkles of operation and management." These "Wrinkles" cover concise and minute details of the care and operation and repair of naval machinery, details which are not found in ordinary text books. These details have been gleaned from all sources and cover latest practice. The subject of feed water heating is covered thoroughly, as are many other subjects, such as operation of evaporators, etc. Tables showing tolerances for boring bearings, standard valves and flanges are valuable additions to the first edition of this handbook. F. W. M.

"Signaling in the U. S. Navy and Merchant Marine." Price, 25 cents. (Boston: Army and Navy Signal Publishers.)

A small, handy pamphlet, in which the various methods of signaling afloat are treated in a concise and easily understood manner. The text first takes up International Flag Signals and illustrates the method of making various hoists in this code. International fog signals, distress signals, and flag waving signals are treated in the same section. The second part takes up U. S. Navy Signal Methods and covers about the same ground as the signaling instructions in the Deck and Boat Book. Sketches are freely used to illustrate the various flag hoists, and the accompanying explanations are clearly worded, though perhaps not so precise as the official instructions on the subject. In the section devoted to call flags the publishers have been unable to describe the most recent practices on account

of their supposedly confidential nature. Wig-wag, blinker and semaphore are treated, as well as a "U. S. Navy Bugle Code," which, the publishers state, has been accepted by the U. S. Government, but appears to be of doubtful utility.

The booklet is accompanied by a revolving signal chart, which should be of considerable use to a beginner in enabling him to fix the various flags and characters in his mind. The card carries two concealed discs by which the alphabet flags, call flags, call pennants and characters of the semaphore code may be displayed in windows in the card proper. These flags and characters are repeated on the fixed part of the card, thus enabling a student to identify any one which he is unable to recognize on sight. It is somewhat to be regretted that the special flags used with the navy code were not incorporated with the alphabet flags, also that the characters of the dot and dash code were not included on the margin of one of the discs. With these improvements the card would cover all the signaling methods in general use.

Notwithstanding these omissions, candidates for the signal bridge, and in fact all who are interested in signaling, but who have not the opportunity for daily practice at actually reading all classes of signals, will find this card and the accompanying instructions a valuable aid. W. C. J. S.

"The A-B-C of Aviation." By Victor W. Pagé. Price, $2.50 net. (Published by The Norman W. Henley Publishing Co., New York.)

The following quotation from the title page of this book gives a general idea of its scope: "A complete, practical treatise, outlining clearly the elements of aeronautical engineering with special reference to simplified explanations of the theory of flight, aerodynamics and basic principles underlying the action of balloons and airplanes of all types. A nontechnical manual for all students of aircraft. This book includes instructions for lining up and inspecting typical airplanes before flight, and also gives easily understood rules for flying."

In my opinion the book is all that is claimed for it, and should prove most valuable to pilots and mechanics. It is couched in the simplest possible language and yet is far from elementary; indeed, some of the subject-matter is covered in a more thorough manner than in any similar work I have read.

The book consists of twelve chapters. The first three are very general: Chapter I dealing with elementary principles of aeronautics, Chapter II describing Lighter-Than-Air Craft, and Chapter III giving a historical sketch of the advance of the art of flying from Henson (1843) to the Wrights (1903). The design of wings is discussed in the succeeding chapter and typical aerofoil sections are illustrated.

Chapter V is devoted to the arrangement, construction and bracing of wings. The effect of gap is treated and the point is made that in the customary biplane arrangement where the gap/chord ratio is about 1 the efficiency is but 80 per cent of a monoplane of the same wing area and aerofoil section. Stagger has very slight effect on efficiency.

In regard to wing plan it is stated that the most efficient type is the raked form in which the trailing edge has greater span than the leading edge. Lest the reader may wonder that this type (first used on the famous Morane-Saulnier monoplane) is not adopted as standard, it should be stated that the rear outboard portions of the wings are subject to serious stresses.

Chapter VI deals with the design and construction of the fuselage and landing gear and also gives lists, descriptions and strength-tables of all the principal woods and metals used in aeroplanes. This is one of the most interesting and valuable portions of the book.

In the following chapter is a very incomplete discussion of aeroplane power plants. This subject has been well covered in the author's "Aviation Engines," recently published.

In contrast to the incompleteness of the subject-matter on engines is the chapter on the design and construction of the airscrew. Special stress is laid upon the mathematical consideration of propeller pitch. The various processes of propeller manufacture, not omitting the balancing and checking for pitch, are very fully explained.

Chapter IX deals with the factors regulating equilibrium and stability and describes the two systems of control—the Deperdussin and the stick—now in use. Some very suggestive notes on piloting are included in this chapter.

Chapter X is practically a reprint of the assembly instructions issued by the Curtiss Company for the JN-4 training machines. For some obscure reason a description of the Sopwith triplane is appended.

In Chapter XI are given some valuable notes on inspecting the parts of an aeroplane before flight. Stress is laid upon the great importance of the pilot verifying the good condition of all vital parts himself and not trusting anybody's opinion on this. Inspection of these parts should always be made in a certain sequence so that none will be omitted.

The final chapter consists of a vocabulary copied from that issued by the National Advisory Committee for Aeronautics. In this list a number of words originally borrowed from the French, but sanctioned by long usage are replaced by substitutes. Thus, "longeron" is discarded for "longitudinal," "fuselage" and "nacelle" for "body," and "empennage" for "tail." Strange to say, however, "balancing flap" is not preferred to "aileron." Personally, I believe there is good reason for retaining most of the French terms in use, as they are generally more descriptive than our would-be equivalents.

Other changes that I should suggest are the substitution of "span" for "spread" (the maximum distance from tip to tip of the wing), and the division of "seaplane" into "float seaplane" and "boat seaplane." This last has been adopted by the British authorities and the more usual "seaplanes and flying boats" discarded. Some change in the vocabulary is necessary, as there is now no definition of an aeroplane with a hull as opposed to floats for alighting on water. J. J. I.

NOTICE TO MEMBERS

More members, both regular and associate, are much desired. Any interest in becoming investigably means larger number of papers and essays submitted, and consequently an improvement in the Proceedings.

You are requested to send or give the attached slip to some one eligible for membership, urging him to join by direction of the Board of Control.

To the Secretary and Treasurer,
U. S. Naval Institute,
Annapolis, Md.

Dear Sir:

Please enroll my name as a { regular / associate } member of the U. S. Naval Institute from this date.

Very truly yours,

NOTICE TO MEMBERS

More members, both regular and associate, are much desired. Any increase in membership invariably means larger number of papers and essays submitted, and consequently an improvement in the PROCEEDINGS.

You are requested to send or give the attached slip to some one eligible for membership, urging him to join.

By direction of the Board of Control,

G. M. RAVENSCROFT,
Secretary-Treasurer.

Attention is invited to extracts from the constitution on the opposite page as to the requirements in making applications for life, regular and associate membership.

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.....191

To the Secretary and Treasurer,
U. S. Naval Institute,
Annapolis, Md.

Dear Sir:

Please enroll my name as a { *regular* / *associate* } *member of the U. S. Naval Institute from this date.*

Very truly yours,

.....

.....

NOTICE

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It is now in its forty-sixth year of existence, trusting as heretofore for its support to the officers and friends of the Navy. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers and communications upon subjects of interest to the naval profession, as well as by personal support and influence.

On the subject of membership the Constitution reads as follows:

ARTICLE VII

Sec. 1. The Institute shall consist of regular, life, honorary and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the Navy subsequent to joining the Institute will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control. To be declared elected, they must receive the affirmative vote of three-quarters of the members represented at regular or stated meetings, either in person or by proxy.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control. The Board of Control will at each regular meeting ballot on the nominations submitted for election, and nominees receiving a majority of the votes of the board membership shall be considered elected to membership in the United States Naval Institute."

Sec. 8. The annual dues for regular and associate members shall be two dollars and fifty cents, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute, and upon the first day of each succeeding January. The fee for life membership shall be forty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

ARTICLE X

Sec. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The PROCEEDINGS are published monthly; subscription for non-members, $3.00; enlisted men, U. S. Navy, $2.50. Single copies, by purchase, 30 cents; issues preceding January, 1919, 50 cents.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ESSAY, 1920

A prize of two hundred dollars, with a gold medal, and a life-membership (unless the author is already a life member) in the Institute, is offered by the Naval Institute for the best original essay on any subject pertaining to the naval profession published in the PROCEEDINGS during the current year. The prize will be in addition to the author's compensation paid upon publication of the essay.

On the opposite page are given suggested topics. Essays are not limited to these topics and no additional weight will be given an essay in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. All original essays published in the PROCEEDINGS during 1919, which are deemed by the Board of Control to be of sufficient merit, will be passed upon by the Board during the month of January, 1920, and the award for the prize will be made by the Board of Control, voting by ballot.

2. No essay received after November 1 will be available for publication in 1919. Essays received subsequent to November 1, if accepted, will be published as soon as practicable thereafter.

3. If, in the opinion of the Board of Control, the best essay published during 1919 is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention," or such other distinction as the Board may decide.

4. In case one or more essays receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership (unless the author is already a life member) in the Institute, the actual amounts of the awards to be decided by the Board of Control in each case.

5. It is requested that all essays be submitted typewritten and in duplicate; essays submitted written in longhand and in single copy will, however, receive equal consideration.

6. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

G. M. RAVENSCROFT,
Commander, U. S. N., Secretary and Treasurer.

TOPICS FOR ESSAYS

SUGGESTED BY REQUEST OF THE BOARD OF CONTROL

"Duties and Responsibilities of Subordinates with Special Reference to the Relations between Commanders-in-Chief and Chief of Naval Operations; Commanders-in-Chief and Force Commanders; Force Commanders and Division Commanders."

"Initiative of the Subordinate—Its True Meaning."

"Military Efficiency Dependent upon National Discipline."

"Governmental Organization for War."

"Naval Gunnery, Now and of the Future."

"Naval Policies."

"The Place of the Naval Officer in International Affairs."

"Moral Preparedness."

"Tact in Relation to Discipline."

"The Principles of Naval Administration in Support of War-Time Operations."

"What Steps in Organization and Training Should be Taken to Maintain and Increase the Efficiency of the Navy at the Close of the Present War."

"Responsibilities and Duties of Naval and Military Officers of the United States in Educating and Informing the Public on Professional Matters."

"A Commission in The Navy: Its Meaning and the Obligations Which It Involves."

"The Relations of an Officer to his Subordinate, Both Commissioned and Enlisted."

"The True Meaning of the Expression 'An Officer and a Gentleman.'"

"The Effect of the Present War upon Views Previously Held of Naval Strategy, Tactics and Logistics."

"Seen in the Light of Recent Events, What Should Be the United States Navy of the Future as Regards Types and Numbers of Ships."

"Probable Future Development of Surface-craft, Air-craft and Submarines and the Relation of these Types to Each Other and to Naval Warfare in General."

"The Grand Strategy of the Great War, with Especial Reference to Coördination, and Lack of Coördination, Between Naval and Military Forces."

"The Problem of Overseas Operations in the Light of Recent Developments."

"The Influence of Sea Power upon History as Illustrated by the Great War."

LIST OF PRIZE ESSAYS

"WHAT THE NAVY HAS BEEN THINKING ABOUT"

1879

Naval Education. Prize Essay, 1879. By Lieut. Commander A. D. Brown, U. S. N.

NAVAL EDUCATION. First Honorable Mention. By Lieut. Commander C. F. Goodrich, U. S. N.

NAVAL EDUCATION. Second Honorable Mention. By Commander A. T. Mahan, U. S. N.

1880

"The Naval Policy of the United States." Prize Essay, 1880. By Lieutenant Charles Belknap, U. S. N.

1881

The Type of (I) Armored Vessel, (II) Cruiser Best Suited to the Present Needs of the United States. Prize Essay, 1881. By Lieutenant E. W. Very, U. S. N.

SECOND PRIZE ESSAY, 1881. By Lieutenant Seaton Schroeder, U. S. N.

1882

Our Merchant Marine: The Causes of Its Decline and the Means to Be Taken for Its Revival. "Nil clarius aquis." Prize Essay, 1882. By Lieutenant J. D. Kelley, U. S. N.

"MAIS IL FAUT CULTIVER NOTRE JARDIN." Honorable Mention. By Master C. G. Calkins, U. S. N.

"SPERO MELIORA." Honorable Mention. By Lieut. Commander F. E. Chadwick, U. S. N.

"CAUSA LATET: VIS EST NOTISSIMA." Honorable Mention. By Lieutenant R. Wainwright, U. S. N.

1883

How May the Sphere of Usefulness of Naval Officers Be Extended in Time of Peace with Advantage to the Country and the Naval Service? "Pour encourager les Autres." Prize Essay, 1883. By Lieutenant Carlos G. Calkins, U. S. N.

"SEMPER PARATUS." First Honorable Mention. By Commander N. H. Farquhar, U. S. N.

"CULIBET IN ARTE SUA CREDENDUM EST." Second Honorable Mention. By Captain A. P. Cooke, U. S. N.

1884

The Reconstruction and Increase of the Navy. Prize Essay, 1884. By Ensign W. I. Chambers, U. S. N.

1885

Inducements for Retaining Trained Seamen in the Navy, and Best System of Rewards for Long and Faithful Service. Prize Essay, 1885. By Commander N. H. Farquhar, U. S. N.

1886

What Changes in Organization and Drill Are Necessary to Sail and Fight Effectively Our Warships of Latest Type? "Scire quod nescias." Prize Essay, 1886. By Lieutenant Carlos G. Calkins, U. S. N.

THE RESULT OF ALL NAVAL ADMINISTRATION AND EFFORTS FINDS ITS EXPRESSION IN GOOD ORGANIZATION AND THOROUGH DRILL ON BOARD OF SUITABLE SHIPS. Honorable Mention. By Ensign W. L. Rodgers, U. S. N.

1887

The Naval Brigade: Its Organization, Equipment and Tactics. "In hoc signo vinces." Prize Essay, 1887. By Lieutenant C. T. Hutchins.

1888

Torpedoes. Prize Essay, 1888. By Lieut. Commander W. W. Reisinger, U. S. N.

1891

The Enlistment, Training and Organization of Crews for Our Ships of War. Prize Essay, 1891. By Ensign A. P. Niblack, U. S. N.

DISPOSITION AND EMPLOYMENT OF THE FLEET: SHIP AND SQUADRON DRILL. Honorable Mention, 1891. By Lieutenant R. C. Smith, U. S. N.

1892

Torpedo-boats: Their Organization and Conduct. Prize Essay, 1892. By Wm. Laird Clowes.

1894

The U. S. S. Vesuvius, with Special Reference to Her Pneumatic Battery. Prize Essay, 1894. By Lieut. Commander Seaton Schroeder, U. S. N.

NAVAL REFORM. Honorable Mention, 1894. By Passed Assistant Engineer F. M. Bennett, U. S. N.

1895

Tactical Problems in Naval Warfare. Prize Essay, 1895. By Lieut. Commander Richard Wainwright, U. S. N.

A SUMMARY OF THE SITUATION AND OUTLOOK IN EUROPE. An Introduction to the Study of Coming War. Honorable Mention, 1895. By Richmond Pearson Hobson, Assistant Naval Constructor, U. S. N.

SUGGESTIONS FOR INCREASING THE EFFICIENCY OF OUR NEW SHIPS. Honorable Mention, 1895. By Naval Constructor Wm. J. Baxter, U. S. N.

THE BATTLE OF THE YALU. Honorable Mention, 1895. By Ensign Frank Marble, U. S. N.

1896

The Tactics of Ships in the Line of Battle. Prize Essay, 1896. By Lieutenant A. P. Niblack, U. S. N.

THE ORGANIZATION, TRAINING AND DISCIPLINE OF THE NAVY PERSONNEL AS VIEWED FROM THE SHIP. Honorable Mention, 1896. By Lieutenant Wm. F. Fullam, U. S. N.

NAVAL APPRENTICES, INDUCEMENTS, ENLISTING AND TRAINING. The Seaman Branch of the Navy. Honorable Mention, 1896. By Ensign Ryland D. Tisdale, U. S. N.

THE COMPOSITION OF THE FLEET. Honorable Mention 1896. By Lieutenant John M. Ellicott, U. S. N.

1897

Torpedo-boat Policy. Prize Essay, 1897. By Lieutenant R. C. Smith, U. S. N.

A PROPOSED UNIFORM COURSE OF INSTRUCTION FOR THE NAVAL MILITIA. Honorable Mention, 1897. By H. G. Dohrman, Associate Member, U. S. N. I.

TORPEDOES IN EXERCISE AND BATTLE. Honorable Mention, 1897. By Lieutenant J. M. Ellicott, U. S. N.

1898

Esprit de Corps: A Tract for the Times. Prize Essay, 1898. By Captain Caspar Frederick Goodrich, U. S. N.

OUR NAVAL POWER. Honorable Mention, 1898. By Lieut. Commander Richard Wainwright, U. S. N.

TARGET PRACTICE AND THE TRAINING OF GUN CAPTAINS. Honorable Mention, 1898. By Ensign R. H. Jackson, U. S. N.

1900

Torpedo Craft: Types and Employment. Prize Essay, 1900. By Lieutenant R. H. Jackson, U. S. N.

THE AUTOMOBILE TORPEDO AND ITS USES. Honorable Mention, 1900. By Lieutenant L. H. Chandler, U. S. N.

1901

Naval Administration and Organization. Prize Essay, 1901. By Lieutenant John Hood, U. S. N.

1903

Gunnery in Our Navy. The Causes of Its Inferiority and Their Remedies. Prize Essay, 1903. By Professor Philip R. Alger, U. S. N.

A NAVAL TRAINING POLICY AND SYSTEM. Honorable Mention, 1903. By Lieutenant James H. Reid, U. S. N.

SYSTEMATIC TRAINING OF THE ENLISTED PERSONNEL OF THE NAVY. Honorable Mention, 1903. By Lieutenant C. L. Hussey, U. S. N.

OUR TORPEDO-BOAT FLOTILLA. The Training Needed to Insure Its Efficiency. Honorable Mention, 1903. By Lieutenant E. L. Beach, U. S. N.

1904

The Fleet and Its Personnel. Prize Essay, 1904. By Lieutenant S. P. Fullinwider, U. S. N.

A PLEA FOR A HIGHER PHYSICAL, MORAL AND INTELLECTUAL STANDARD OF THE PERSONNEL FOR THE NAVY. Honorable Mention, 1904. By Medical Inspector Howard E. Ames, U. S. N.

1905

American Naval Policy. Prize, Essay 1905. By Commander Bradley A. Fiske, U. S. N.

THE DEPARTMENT OF THE NAVY. Honorable Mention, 1905. By Rear Admiral Stephen B. Luce, U. S. N.

1906

Promotion by Selection. Prize Essay, 1906. By Commander Hawley O. Rittenhouse, U. S. N.

THE ELEMENTS OF FLEET TACTICS. First Honorable Mention, 1906. By Lieut. Commander A. P. Niblack, U. S. N.

GLEANINGS FROM THE SEA OF JAPAN. Second Honorable Mention, 1906. By Captain Seaton Schroeder, U. S. N.

THE PURCHASE SYSTEM OF THE NAVY. Third Honorable Mention, 1906 By Pay Inspector J. A. Mudd. U. S. N.

1907

Storekeeping at the Navy Yards. Prize Essay, 1907. By Pay Inspector John A. Mudd, U. S. N.

BATTLE REHEARSALS. A Few Thoughts on Our Next Step in Fleet-Gunnery. First Honorable Mention, 1907. By Lieut. Commander Yates Stirling, U. S. N.

THE NAVAL PROFESSION. Second Honorable Mention, 1907. By Commander Bradley A. Fiske, U. S. N.

1908

A Few Hints to the Study of Naval Tactics. Prize Essay, 1908. By Lieutenant W. S. Pye, U. S. N.

THE MONEY FOR THE NAVY. First Honorable Mention, 1908. By Pay Inspector John A. Mudd, U. S. N.

THE NATION'S DEFENCE—THE OFFENSIVE FLEET. How Shall We Prepare It for Battle? Second Honorable Mention, 1908. By Lieut. Commander Yates Stirling, U. S. N.

1909

Some Ideas about Organization on Board Ship. Prize Essay, 1909. By Lieutenant Ernest J. King, U. S. N.

THE NAVY AND COAST DEFENCE. Honorable Mention, 1909. By Commodore W. H. Beehler, U. S. N.

THE REORGANIZATION OF THE NAVAL ESTABLISHMENT. Honorable Mention, 1909. By Pay Inspector J. A. Mudd, U. S. N.

A PLEA FOR PHYSICAL TRAINING IN THE NAVY. Honorable Mention, 1909. By Commander A. P. Niblack, U. S. N.

1910

The Merchant Marine and the Navy. Prize Essay, 1910. By Naval Constructor T. G. Roberts, U. S. N.

THE NAVAL STRATEGY OF THE RUSSO-JAPANESE WAR. Honorable Mention, 1910. By Lieutenant Lyman A. Cotton, U. S. N.

1911

Navy Yard Economy. Prize Essay, 1911. By Paymaster Charles Conard, U. S. N.

NAVAL POWER. Honorable Mention, 1911. By Captain Bradley A. Fiske, U. S. N.

WANTED—FIRST AID. Honorable Mention, 1911. By Commander C. C. Marsh, U. S. N.

1912

Naval Might. Prize Essay, 1912. By Lieutenant Ridgely Hunt, U. S. N. (retired).

INSPECTION DUTY AT THE NAVY YARDS. Honorable Mention, 1912. By Lieut. Commander T. D. Parker, U. S. N.

1913

The Greatest Need of the Atlantic Fleet. Prize Essay, 1913. By Lieut. Commander Harry E. Yarnell, U. S. N.

NAVY DEPARTMENT ORGANIZATION. A Study of Principles. First Honorable Mention, 1913. By Commander Yates Stirling, Jr., U. S. N.

TRAINED INITIATIVE AND UNITY OF ACTION. Second Honorable Mention, 1913. By Lieut. Commander Dudley W. Knox, U. S. N.

1914

The Great Lesson from Nelson for To-day. Prize Essay, 1914. By Lieut. Commander Dudley W. Knox, U. S. N.

NAVAL POLICY AS IT RELATES TO THE SHORE ESTABLISHMENT AND THE MAINTENANCE OF THE FLEET. Honorable Mention, 1914. By Captain John Hood, U. S. N.

OLD PRINCIPLES AND MODERN APPLICATIONS. Honorable Mention, 1914. By Lieut. Commander Dudley W. Knox, U. S. N.

MILITARY PREPAREDNESS. Honorable Mention, 1914. By Naval Constructor Richard D. Gatewood, U. S. N.

1915

The Rôle of Doctrine in Naval Warfare. Prize Essay, 1915. By Lieut. Commander Dudley W. Knox, U. S. N.

AN AIR FLEET: OUR PRESSING NAVAL WANT. First Honorable Mention, 1915. By Lieut. Commander Thomas Drayton Parker, U. S. N.

TACTICS. Second Honorable Mention, 1915. By Ensign H. H. Frost, U. S. N.

DEFENCE AGAINST SURPRISE TORPEDO ATTACK. Third Honorable Mention, 1915. By Ensign R. T. Merrill, 2d, U. S. N.

1916

The Moral Factor in War. Prize Essay, 1916. By Lieutenant (J. G.) H. H. Frost, U. S. N.

NAVAL PERSONNEL. First Honorable Mention, 1916. By Lieut. Commander J. K. Taussig, U. S. N.

EDUCATION AT THE U. S. NAVAL ACADEMY. Second Honorable Mention, 1916. By Lieutenant Ridgely Hunt, U. S. N.

SOME UNDERLYING PRINCIPLES OF MORALE. Third Honorable Mention, 1916. By Commander Dudley W. Knox, U. S. N.

LARGE *vs.* A GREATER NUMBER OF SMALLER BATTLESHIPS. Lippincott Prize Essay. By Lieut. Commander Thomas Lee Johnson, U. S. N.

1917

Commerce Destroying in War. Prize Essay, 1917. By Commander Lyman A. Cotten, U. S. Navy.

THE PEOPLE'S RÔLE IN WAR. First Honorable Mention, 1917. By Lieutenant H. H. Frost, U. S. Navy.

THE NATION'S GREATEST NEED. Second Honorable Mention, 1917. By Colonel Dion Williams, U. S. Marine Corps.

1918

Letters on Naval Tactics. Prize Essay, 1918. By Lieutenant H. H. Frost, U. S. N.

THE PREPAREDNESS OF THE FUTURE. First Honorable mention, 1918. By Commander H. O. Rittenhouse, U. S. N. Retired.

NAVAL STRATEGY. Second Honorable Mention, 1918. By Rear Admiral Bradley A. Fiske, U. S. N.

1919

MILITARY CHARACTER. First Honorable Mention, 1918. By Captain Reginald R. Belknap, U. S. N.

SOME REFLECTIONS ON THE THREE FACTORS OF BATTLESHIP DESIGN. Second Honorable Mention, 1918. By Lieut. Commander Beirne S. Bullard, C. C., U. S. N.